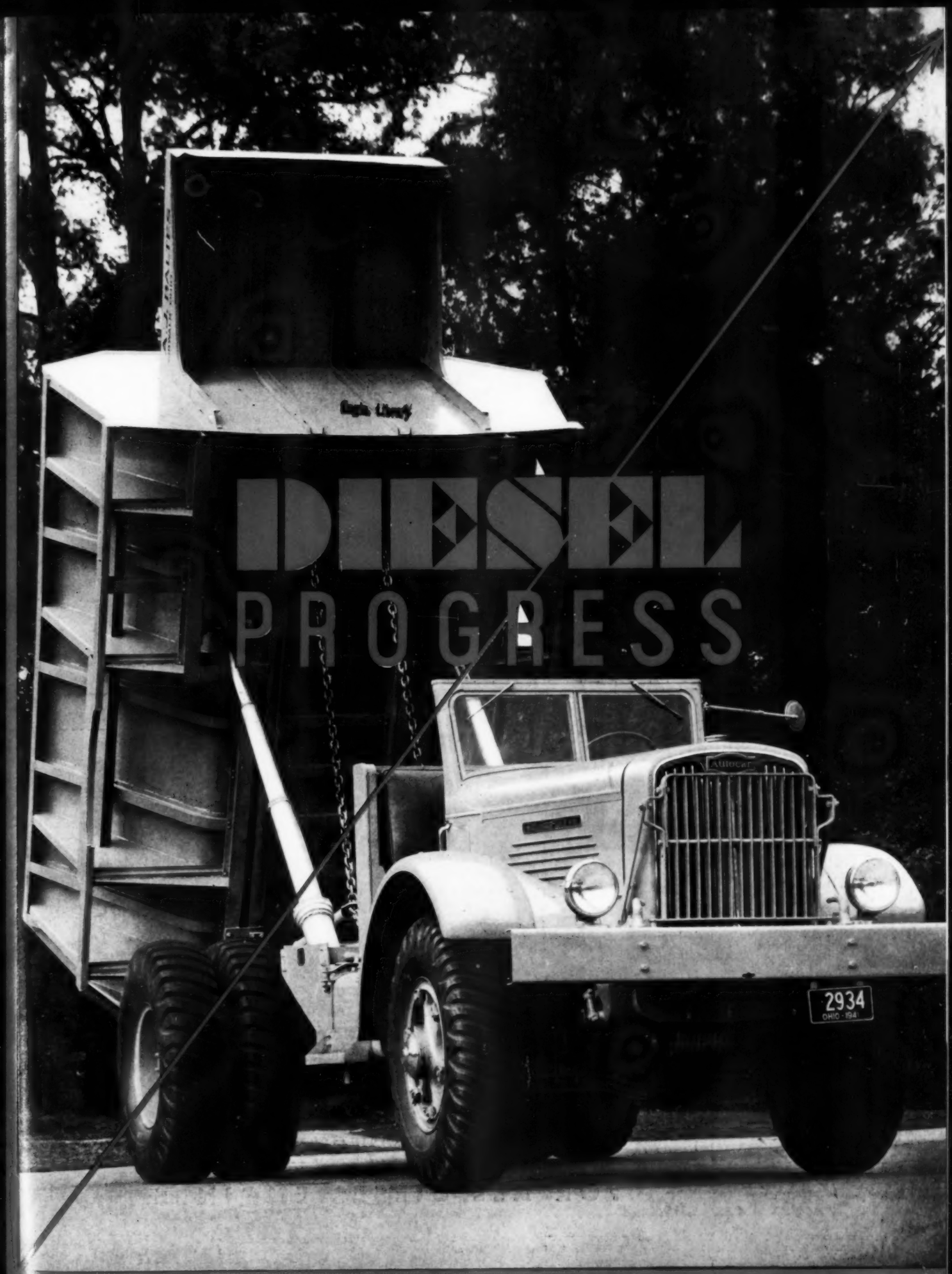


MARCH, 1941

Free Rings in Your Diesels *Now!*

NO MATTER what your experience has been up to now, you can begin immediately to enjoy the advantages of piston rings free in their grooves, exhaust ports free from hard carbon deposits.

Right now . . . today . . . thousands of operators are getting these desirable results . . . by lubricating their Diesels with *TEXACO Algol or Ursa Oils.*

Texaco Algol or *Ursa Oils* provide that wear-resisting lubricating film that assures free rings and valves, effective piston seal, full compression, excellent fuel economy.

Because of these money-saving results:

More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand

The outstanding performance that has made Texaco preferred in the Diesel field has also made it preferred in the fields listed in the panel. Buyers in these fields are enjoying many benefits. You, too, will find important advantages when you use Texaco Lubricants and Fuels.

A Texaco Lubrication Engineer will gladly cooperate in improving Diesel efficiency in your plant. Phone the nearest of more than 2300 Texaco distributing plants in the 48 States, or write:

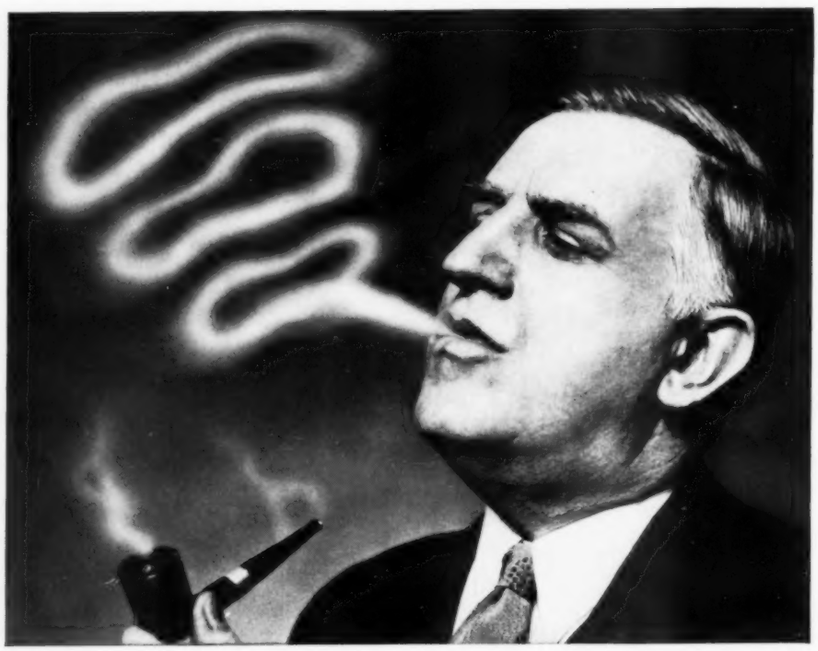
The Texas Company, 135 East 42nd Street, New York, N. Y.

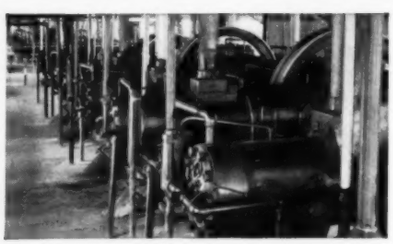
TEXACO DEALERS INVITE YOU TO ENJOY

FRED ALLEN in a full-hour program every Wednesday night. CBS, 9:00 E.S.T., 8:00 C.S.T., 10:00 M.S.T., 9:00 P.S.T.

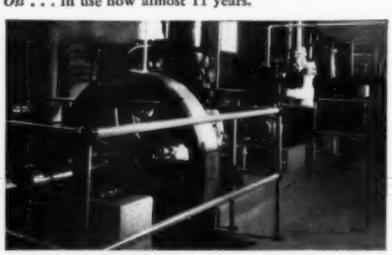
METROPOLITAN OPERA every Saturday afternoon, NBC. See local newspaper for time and station.

JUST OFF THE PRESS—Revised and enlarged 92-page booklet, "Diesel Operation." Yours for the asking.





RING STICKING STOPPED in these 10 gas engines (7 Bessemer, 3 Clark) when the Portland Gasoline Company, Pampa, Tex., began lubricating with *Texaco Algol Oil* . . . in use now almost 11 years.



BETTER RING SEAL and higher compression resulted when Montvale Ice Co. (N. J.) began lubricating these Fairbanks-Morse Diesels with *Texaco Ursa Oils.* No sticking rings here, less carbon, less wear.

THEY PREFER TEXACO

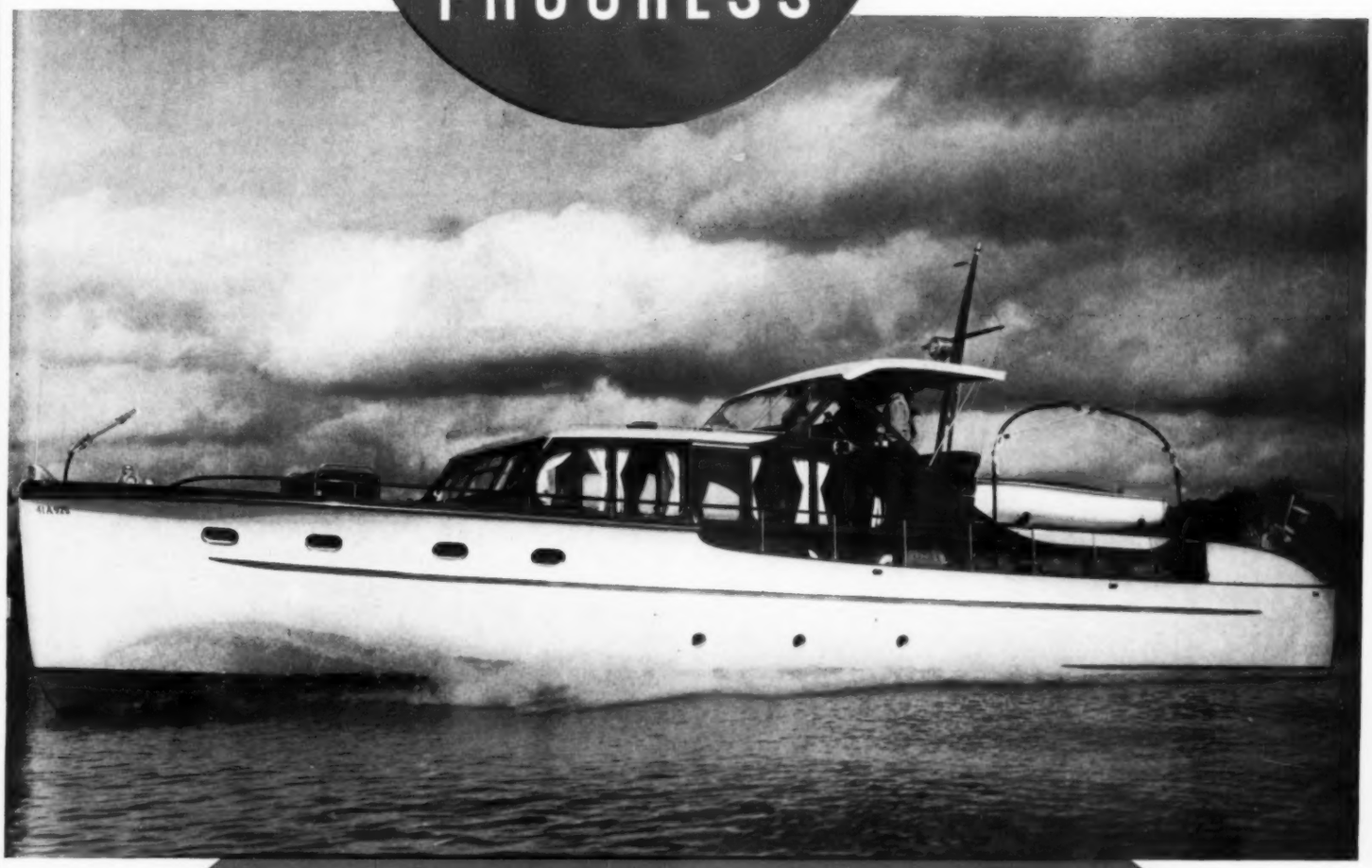
- ★ More railroad rolling equipment in the U. S. is lubricated with Texaco than with any other brand.
- ★ More tourists use Texaco *Fire-Chief* Gasoline than any other brand.
- ★ More scheduled airline mileage within the U.S. and to other countries is flown with Texaco than with any other brand.
- ★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.
- ★ More copper is produced in the U. S. by mines using Texaco Products than by all other copper mines combined.
- ★ More stationary Diesel horsepower in the U.S. is lubricated with Texaco than with any other brand.
- ★ More Diesel horsepower on streamlined trains in the U.S. is lubricated with Texaco than with all other brands combined.

TEXACO Lubricants and Fuels

FOR ALL DIESEL ENGINES

DIESEL PROGRESS for March, 1941. Volume VII, Number 3. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 West Forty-fifth Street, New York, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., authorized March 27, 1940. Subscription rates: United States and Possessions $3.00. Canada and all other countries $5.00 per year. Single copy price 25 cents in U. S. A., 50 cents for all other countries.

DIESEL and GAS ENGINE PROGRESS



MARCH CONTENTS

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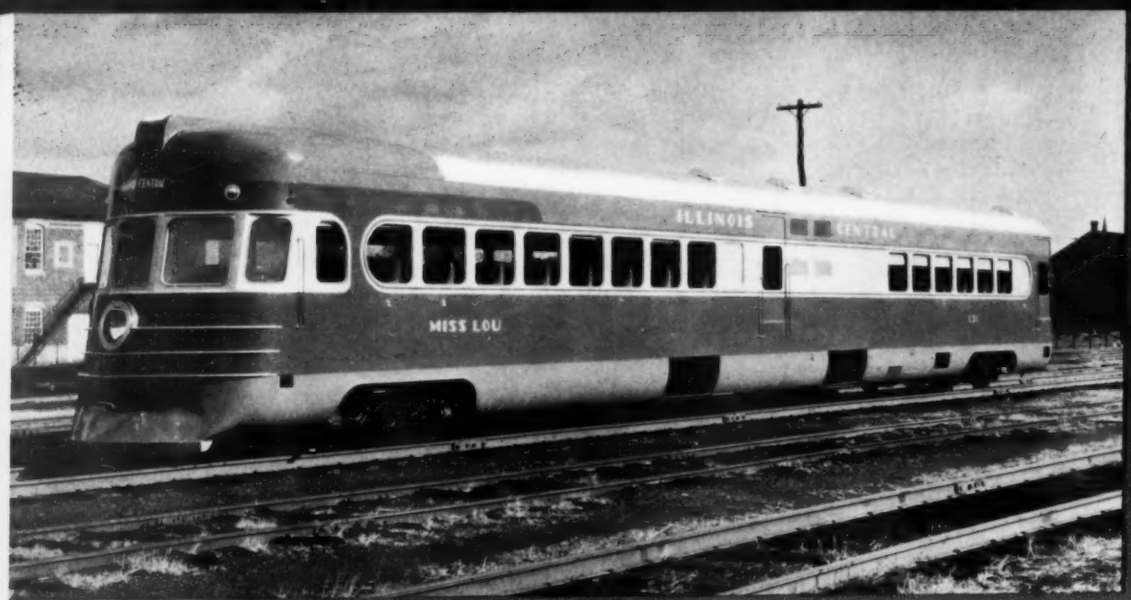
REX W. WADMAN
Editor and Publisher

FRONT COVER ILLUSTRATION: Another good example of the type of heavy duty trucks making money for road contractors throughout the country is this Autocar 158" wheelbase, Model DC100D truck powered with a Cummins 150 hp., six cylinder Diesel, and owned by A. J. Baltes, Road Contractor, of Norwalk, Ohio.

TABLE OF CONTENTS ILLUSTRATION: *Roamer II* shown above is a new 55 ft. Chris-Craft yacht recently delivered to L. W. Greve of Cleveland, Ohio. This 1941 model yacht provides accommodations for eight persons and is powered with twin 165 hp. Gray Marine Diesels which propel her at a speed of sixteen miles per hour.

DIESEL PROGRESS for March, 1941, Vol. VII, No. 3. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York, N. Y. Tel. MUrray Hill 2-5092. Subscription rates: U. S. A. and Possessions, $3.00 per year; 25c per copy. All other countries, $5.00 per year; 50c per copy.

HEYWORTH CAMPBELL
Art Director



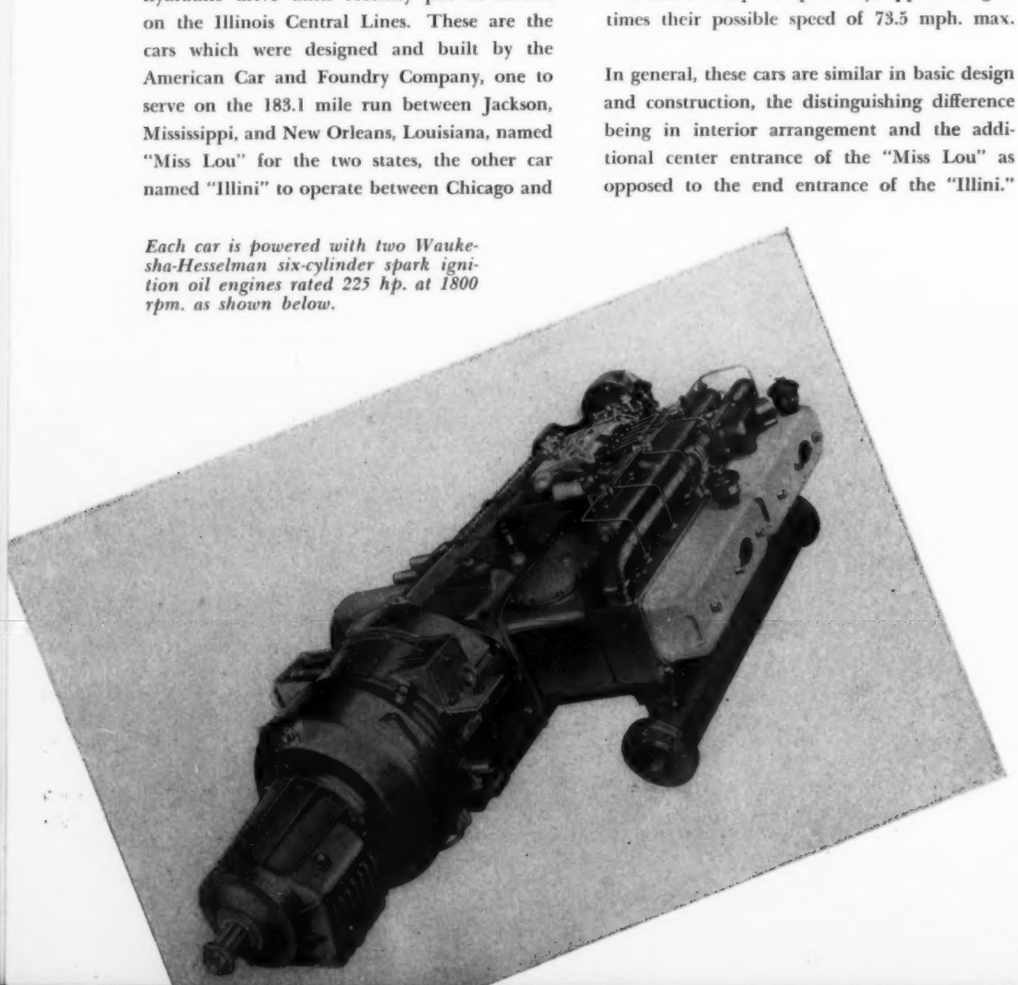
ILLINOIS CENTRAL RAIL CARS

By GEORGE D. CROSSLEY

FURTHER interesting progress in the development and application of self-propelled rail cars is shown in the two oil engine, hydraulic drive units recently put in service on the Illinois Central Lines. These are the cars which were designed and built by the American Car and Foundry Company, one to serve on the 183.1 mile run between Jackson, Mississippi, and New Orleans, Louisiana, named "Miss Lou" for the two states, the other car named "Illini" to operate between Chicago and Champaign, Illinois, a distance of 126.4 miles. To meet their operating schedules on these runs, the cars must make average speeds of 45.8 and 49.1 mph. respectively, approaching at times their possible speed of 73.5 mph. max.

In general, these cars are similar in basic design and construction, the distinguishing difference being in interior arrangement and the additional center entrance of the "Miss Lou" as opposed to the end entrance of the "Illini."

Each car is powered with two Waukesha-Hesselman six-cylinder spark ignition oil engines rated 225 hp. at 1800 rpm. as shown below.



The power plants for the two cars are identical and resemble the plan originated by A.C.F. for the Susquehanna Rail cars which were described in DIESEL PROGRESS, August 1940, except that there are two Waukesha-Hesselman, oil burning, spark ignition engines in each of these new cars, and the engines are not supercharged, as was the single Waukesha-Hesselman engine in each of the Susquehanna cars. These are 6 cylinder, 6¼" bore, 6½" stroke, solid injection, semi-Diesels, which develop 225 hp. at their maximum governed speed of 1800 rpm. They are of the horizontal, flat-bed type and are arranged, together with each complete set of power equipment, underneath the car symmetrically about the transverse centerline of the car and in a very compact manner.

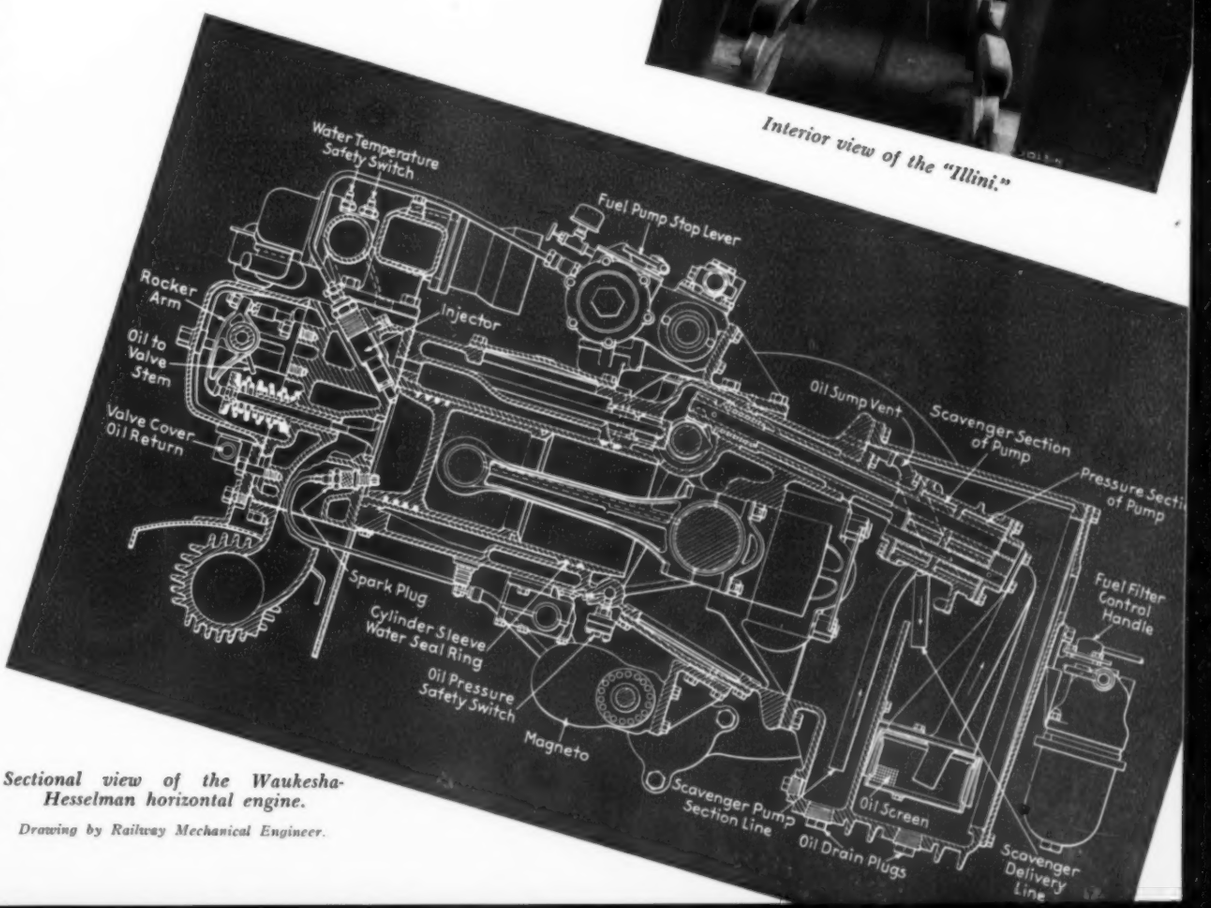
Transmission is accomplished through Twin Disc Hydraulic Torque Converters embodying both hydraulic and direct drive with duplex clutch features, as well as free wheeling elements also previously described in detail in the August, 1940, issue of DIESEL PROGRESS. Each torque converter is attached to the engine flywheel housing with the drive shafts extending toward each truck. Connection to the drive axles is made through solid universal joints and propeller shafts. A midship bearing retains the outer end of each drive shaft, there being a drive shaft clearance hole in each truck bolster.

The accessories for each engine consist of a 20 kw., 125 volt, dc. generator, a 12 volt generator, a cooling water pump and a 12 cu. ft. air compressor. Each engine drives its own accessories through a propeller shaft extending from the timing gear and of the engine connected to the main V-belt sheave. Engine cooling is effected through double sections of radiators for each engine having thermostatically controlled shutters and V-belt driven 26″ aluminum fans.

The dual voltage system; i.e., 12 volts and 125 volts, provides for handling engine starting, the head light, and various small accessories on the 12 volt circuit and the electric heaters, ranges, water heaters, and lights on the 125 volt circuit. Each car carries a 56 cell Exide Ironclad storage battery. These complete, self-contained rail cars are heated and air conditioned by specially designed A.C.F. all-weather units which include a 6½ ton fin and tube cooling unit and arrangements for taking air through outside grilles and blowing in turn through high pressure and low pressure ducts which distribute it throughout the car. Heating is accomplished by taking hot water from the engine cooling system into the fin coils and reversing the flow of air. A 12 kw. electric heating unit is installed in each car for supplemental heating.

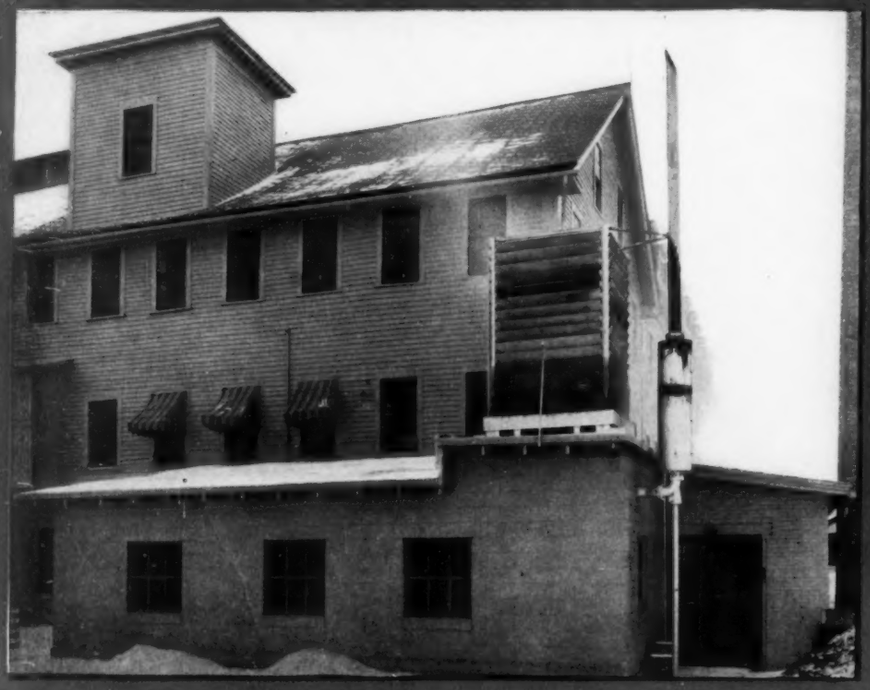
Each car is equipped for buffet dining service, the southern car, "Miss Lou" having its two passenger sections divided by the center entrance vestibule, forward of which are toilets and to the rear, lockers and buffet in turn. The "Illini" has its buffet, lockers, toilets, and entrance all in the rear with its single passenger section extending to the forward end of the car.

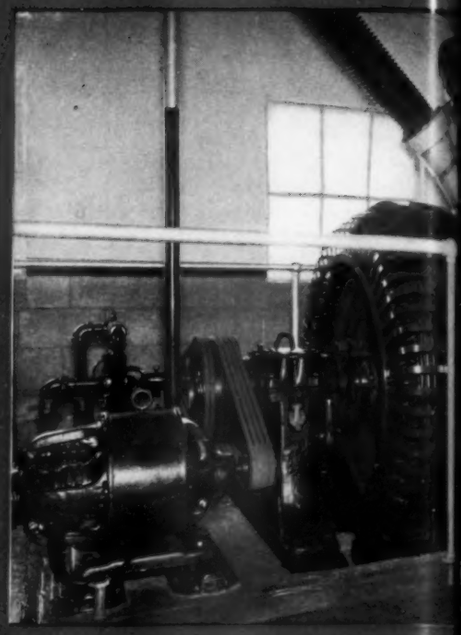
Interior view of the "Illini."



Sectional view of the Waukesha-Hesselman horizontal engine.

Drawing by Railway Mechanical Engineer.





Left, foreground: The new engine building, Binks cooling tower, and Maxim exhaust silencer. The three engine views show the excellent arrangement and maintenance of the industrial power plant; note Air-Maze intake filter and silencer, Alnor exhaust Pyrometer and Viking alarm control, below.

NEW ENGLAND PLANT DIESELIZED

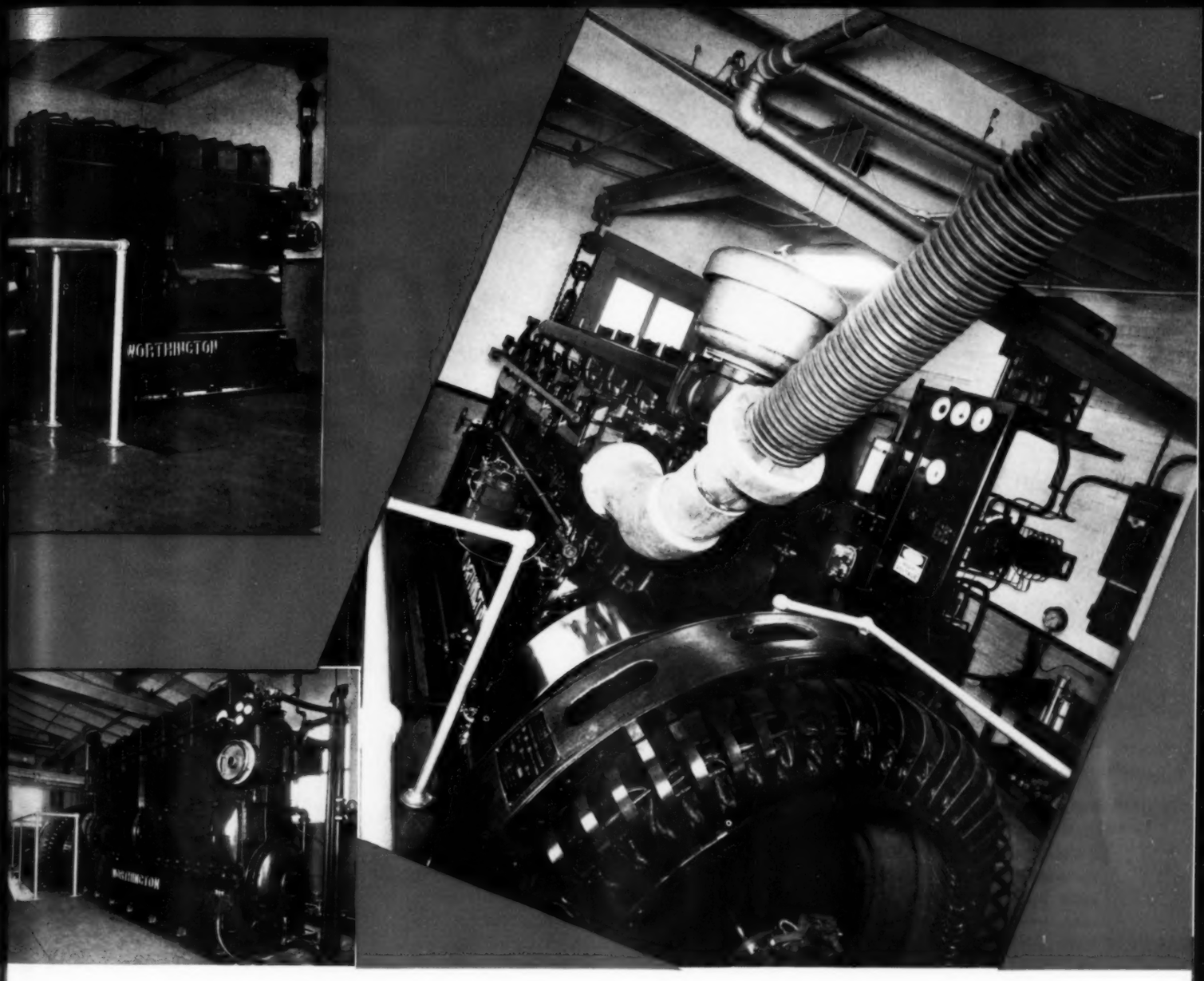
By WILBUR W. YOUNG

OF the many reasons why the management of a manufacturing plant, after long and careful consideration, severs all utility connection and places complete dependence upon a Diesel-electric generating unit, Diesel dependability, under daily demand and in emergencies, is not the least but anticipated economy is by far the most activating. And after a full year of Diesel operation, when the figures show savings which surpass all reasonable expectations, it is not surprising to find this management not only satisfied with its decision but also acting as host to pilgrimages from industrial plants far and near seeking first-hand information on how to cut their power costs.

Such is the picture at the Gavitt Manufacturing Company, Inc., located in the quiet New England town of Brookfield, Massachusetts, where a little over a year ago L. E. Gavitt, Treasurer, added a modern, concrete-block engine room to the aging building which this business occupies and installed a Worthington Diesel engine with a direct connected Westinghouse alternator and all the auxiliaries necessary to render this power source complete and independent of outside connection. This move was hampered by the usual resistance on the part of the utility, but Mr. Gavitt had thought his way through to a clear decision and subsequent experience has amply justified his persistence in seeing the plan through. He personally supervised the job through construction of the building, the engine foundation, erection of the machinery, the eventful first run, even to the installation of a whistle which is connected to the starting air bottle, (250 lbs. per sq. in.) presumbly to be blown only on special occasions, such as the Fourth of July, New Year's Eve, or for visiting firemen.

This engine is a Worthington completely enclosed, 6 cylinder, 8" bore, 10" stroke, 4 cycle, full Diesel, developing 180 hp. at 600 rpm., equipped with a Pickering governor, American Bosch individual fuel injection pumps and fuel oil filter. Alnor round type multipoint exhaust pyrometer, Viking lube oil pressure and jacket water temperature safety alarm control connected to horns in various parts of the plant, a Gross lube oil cooler, Air-Maze intake silencer and filter.

In addition to the Cuno lube oil filter supplied with the engine, a pair of Skinner Purifiers are connected in the lube oil system so that two complete passes of the lube oil through the filters is accomplished every twelve hours by the built-in circulating pump. With this arrangement, the Texas Algol lube oil is run 2,000 hours in the engine and is still in satis-



factory condition to be used for lubrication of plant machinery. A by-pass connection from the breather pipe to the intake manifold, worked out by Mr. Gavitt and Worthington several months after installation of the engine, maintains a moderate vacuum on the crankcase and it actually halved lube oil consumption.

Thorough silencing of the engine exhaust is not only desirable but necessary because the Gavitt plant is in the very middle of this quiet village. This is accomplished to the satisfaction of all by a Maxim silencer mounted outside.

Starting air is supplied by a Worthington compressor arranged for either motor or gas engine drive. The generating unit is operated from 7:30 a.m. until midnight when a 1,000 watt Onan automatic gas engine driven light plant takes over to carry emergency lights throughout the plant for the balance of the night. All electrical equipment is Westinghouse.

The arrangement of this self-sufficient power plant reflects good planning and its spic and span maintenance shows pride of ownership that comes from satisfaction delivered.

The Gavitt Manufacturing Company produces a wide variety of insulated wire and cable for the radio, electric, and automotive industries, as well as delicate tinsel cord used in hearing aid devices and special cord for the U. S. Army Signal Corps. The plant machinery is such that it generally imposes a fairly normal electrical load, with the exception of one large rubber mill which absorbs 50 hp. intermittently. This condition, of course, results in an unfavorable power factor which should be kept in mind as the following figures are read.

This Diesel generating plant produced a total of 224,500 kwh. in the first full year of operation. At $.03, the cost of purchased power, this would have amounted to $6735. The actual manufacturing cost of this power was $1347, leaving a gross savings of $5388. Further charges applicable to the cost of producing this power, including maintenance reserve, depreciation, interest, and insurance, brought the net savings to $3528. This took care of amortization of the investment at a rate representing a considerably shorter than normal period and left a clear profit of $636.

In view of the above figures, it is little wonder that Mr. Gavitt is both proud to show his Diesel installation and willing to recommend thorough investigation of the Diesel solution of power problems to the many industrial plant engineers who come to see and to listen.

AMERICA'S FIRST DIESEL MAINLINE FR

By CHAS. F. A. MANN

LONG the fond dream of railroaders and the Diesel engine industry is the advent of a heavy-duty, strictly line-haul Diesel freight locomotive. Early in February, this achievement in World railway power will cease to be a dream and two of them will begin their labors of dragging heavy Santa Fe freight trains over the Western Mountains at new high speeds, on new, tighter schedules, and with mountain operations, both uphill and downhill, on a basis never before tried on any of the World's railway systems. Sometime in the Spring of 1941 the Boston & Maine will accept delivery of smaller units of exactly the same type.

Thus, with Europe in the midst of a chaos that may either destroy or cause the European Diesel railway industry irreparable loss, America, who borrowed the railway Diesel idea from Europe where it originated, again steps into the pioneering field of this great and untapped reservoir of application of Diesel engine power.

America already has individual railway systems with more Diesel passenger train mileage run out each twenty-four hours, than the entire systems of France and Germany put together. We lead the world in the number of high speed passenger schedules driven by Diesel locomotives. By 1944, America will have more Diesel switch engines in service than all "shunters," both steam and Diesel, employed by all the railroads of France, England, Germany, and Denmark combined.

While Europe gasps at our vast, far-flung adoption of Diesels for railway power—yet does little, American lines have undertaken a revolution in motive power that almost staggers the imagination. The year just closed saw 99% of the switch engines and over 25% of the passenger locomotives ordered Diesel instead of steam. Yet, in 1937, the old-fashioned gang was proudly publicizing the merits of new, high pressure steam switching locomotives and rumors were afloat about a new Turbo-Electric locomotive that would revolutionize the railway power business and run the Diesel off the map! But the orders for steam switchers have dropped to zero and the much-ballyhooed turbo-electric locomotive is still a large question mark, a victim, largely, of that extra step in conversion of fuel into power which does not hold true with Diesels. Further refinements of conventional steam locomotive design will probably come nearer to increasing steam efficiency than complicated turbine designs.

The development of the line-haul Diesel freight locomotive had two severe handicaps to overcome from the very beginning: First, practically everybody connected with the railroad industry and two-thirds of those connected with the Diesel industry felt from the start—even cheerfully admitted to each other, that the large size, high pressure steam freight locomotive was a "natural," because steam power gets more efficient as your machine gets bigger. Second, the old Diesel bugaboo, initial cost.

These new Diesel-electrics were okay for high speed, non-stop passenger service, and the truck-like efficiency of the Diesel switcher was just the thing for this kind of service. But, when you get into big power, then the steam locomotive can out-perform any other kind of railway power, electric locomotives included. A third complication reared its ugly head, and that was the dependence of railroads on coal-hauling for their freight revenue, almost, in many cases, an unbeatable argument.

Throughout the U. S. A., however, are many railroads that do not derive much revenue from hauling coal. There are many that do not own coal-mining subsidiaries. And there are some that even own or are vitally interested in the petroleum industry. And lastly, there are many railroads who do a fabulous business with the automobile industry which doesn't care what kind of power hauls its finished, semi-manufactured, or raw materials. In fact, when one digs into the picture, there are two sides to the coal hauling business that in many cases will not offset the economy of outright departure from coal powered operation. No better proof exists than in the case of the Pennsylvania Railroad, which marches right along with its electrification program and buys less and less coal directly for its own power needs.

Roughly, better than half of the total railway mileage in the United States is free to operate with Diesel, steam or any other kind of power that will economically deliver 100% performance on its merits. Actually, it might be cheaper to haul coal with Diesel locomotives if most of the truth were known.

But what, you may ask, does this steam-Diesel battle have to do with freight Diesel engine power? Well, the answer is plain: Nobody is going into a field as competitive as this one is and kick around a hot potato unless the stakes are high. Once you start building Diesel freight locomotives that cost $700,000 a piece, you are in an industry that requires huge plant facilities, long range planning, and an economy that will look ahead twenty years toward servicing the Diesel locomotive bought in 1941. Locomotives have to be long-lived and dependable. They can't be discarded like last year's

The 5400 hp. Electro Motive Diesel freight locomotive.

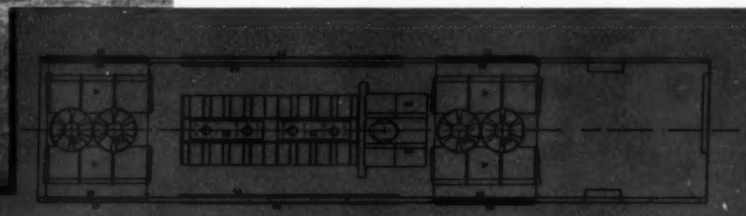
hat. They cost $25,000 a year on 5% depreciation basis, alone. And when they run 100,000 miles, they're just nicely broken in!

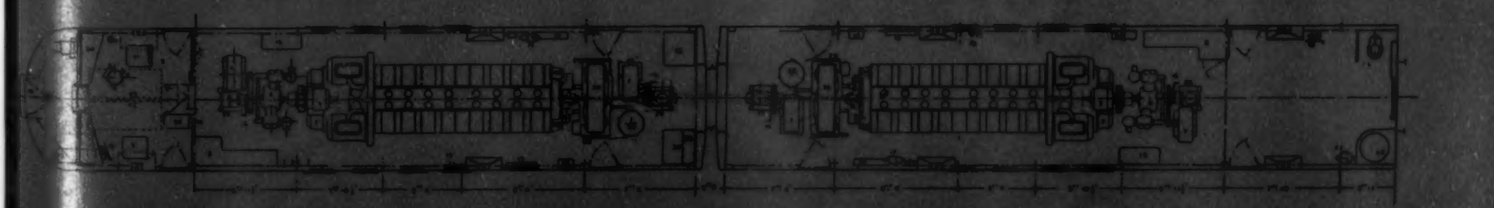
Pioneer in the American & World Diesel freight locomotive field is Electro Motive Corporation, the same people who suffered the blows of pioneering passenger locomotives. In their huge La Grange plant, they have a vast wing devoted to this new phase of railway power. In their fabricating bay, they have evolved a line-production system where the 2,000 hp. passenger

FREIGHT LOCOMOTIVES COMPLETED

unit, the 600, and 1,000 hp. switcher units and, now, the 2,700 hp. freight units are put together somewhat like automobiles with the difference that materials flow to the product being assembled rather than the product being carried past parts stations. Since 1935, they have enlarged the plant three times. In 1933, when railroad statistics were all kept in nice, bright red ink, hay was the principal crop of the vast covered acreage at La Grange, now comprising the largest Diesel locomotive plant of any kind ever built in the World. Seven years ago, an industry that did not exist is now one of the largest of any railway power manufacturing plants on earth!

The basic scheme of the EMC freight locomotive goes back to the fundamental EMC unit system. The traction motors, generators, Diesel engines, and individual units of each freight locomotive are standard sized integrated parts, built around the basic EMC type of 2-cycle Diesel. Not since some of the early Union Pacific Streamliners has EMC built any 16 cylinder Diesels for locomotives until plans were drawn for the first freight locomotive.





EQUIPMENT LIST

1. Engines EMC Model 16-567—1350 hp. each.
2. Main Generator EMC Model D-8.
3. Aux. Generator.
4. Controller.
5. High Voltage Cabinet.
6. Air Compressor.
7. Traction Motor Blower.
8. Sand Boxes.
9. Operator's Cab.
10. Train Control Equipment.
11. Distributing Valve 8-A.
12. Engine Control and Instrument Panel.
13. Load Regulator Resistor Panel.
14. Load Regulator.
15. Low Voltage Cabinet.
16. Fan Drive Clutch.
17. Engine Fuel Pump.
18. Hand Brake.
19. Fuel Tank Vent with Flame Arrester.
20. Lubricating Oil Tank.
22. Oil Marker Light Bracket.
24. Resistor Cabinet.
25. Toilet.
26. Fan Drive.
27. Fans—26".
28. Shutters.
29. Engine Cooling Water Tank.
30. Oil Cooler.
31. Radiator.
32. Exhaust Manifold.
33. Air Intake-Cooling System.
34. Horn.
35. Sand Filler.
37. Fuel Filler.
38. Batteries.
39. Lub. Oil Filter.
40. Fuel Tank—1200 gal.
41. Generator Service Door.
42. Main Air Reservoir.
43. Air Intake—Engine Room.
44. Air Filters.
45. Fuel Tank Gauge.
46. Door.
47. Classification Light.
48. Classification Flag Bracket.
49. Blue Flag Bracket.
50. Locker.
51. Seat.
52. Air Brake Equipment.
53. Distribution Cabinet.
54. Instrument Panel.
55. Air Duct.

In the new freight locomotive, the 16 cylinder 1,350 hp. Diesel, a generator, and four traction motors, geared to four pairs of driving wheels on two 4-wheel trucks, all neatly fitted into a very short (48 ft.) mounting, forms the basic EMC Diesel freight section. Two of these 1,350 hp. single engined sections are permanently coupled together to form a single 2,700 hp. basic freight locomotive unit, with operating cab at one end of one of the units, complete and ready for the road as a light freight locomotive capable of hauling forty or fifty cars on level ground. Thus, by the use of a single 16 cylinder Diesel, eliminating the heating boiler, and carrying the whole cab section on 4-wheel trucks instead of 6 wheel passenger-type trucks, you have the basic 2,700 hp. EMC freight unit as distinguished from the high-speed, 2-engined, 2,000 hp. passenger unit complete with heating boiler and extra passenger train equipment as with the passenger units, when two of these 2,700 hp. freight units are coupled, you have a single, completely self-contained 5,400 hp. freight locomotive operated from one control station. The units lose all separate operating identity when so coupled. The new EMC freight type is of much heavier construction, somewhat wider, and the blunt front ends are braced and built up to withstand terrific collision impact.

The first one built was a carefully-guarded, mobile secret, completed early in 1940 and sent on tour of practically every Class A railroad in the U. S. A. It consisted of two 2,700 hp. locomotive sections coupled together, back to back, to form a 5,400 hp. locomotive. The very short cab sections permitted negotiating the sharpest of mountain curvature, each section being actually shorter over the coupler faces than a standard boxcar. There is twice the mileage of mountain grades in the U. S. A. which will take EMC freight power rather than the long passenger power. If operating conditions warrant, the two sections can be uncoupled and used as way-freight locomotives and operate on sharp-curved side trackage and industrial spurs.

Because the Santa Fe Railway's two locomotives will be identical in every respect save one, this description of the EMC Original will suffice for the Santa Fe's gleaming beauties that will go out on the line shortly.

General description of 5,400 hp. unit: Overall length 193 ft., rigid wheelbase 9 ft. 0 in., total weight of eight trucks 856,000 lbs., fully loaded, fuel capacity 4,800 gallons total, sand 80 cu. ft. total, truck designed for 23 deg. curve, 250 ft. radius, or can turn in a 500 ft. circle, width 9 ft. 10 ins., four Diesels 16 cylinder, 1,350, type EMC, 2 cycle with four exhaust valves per cylinder and two double scavenging blowers per engine. Cylinders 8½ in. bore and 10 in. stroke. Each engine has ten bearing crankshaft; carries a 74-78 volt, 10 kw. generator, a 3-cylinder Gardner-Denver air compressor, and two engine-driven blowers for cooling air to each traction motor housing. The main generator is an EMC Type D. 8, 600 volt, dc. machine. Each generator drives four EMC type D-7B D.C. roller bearing motors, mounted directly on each axle, with gear ratio of 59 to 18. Each 2,700 hp. unit has a 32 cell Exide Ironclad storage battery serving two of the four locomotive sections. All water circulating, fuel oil, lube oil, and cooling air fans driven direct from the main engine through shaft and belting. Four 34 inch, vertical fans delivering 80,000 cfm. of air per engine take care of water cooling under all load and temperature conditions

Provision is made for steam jet water heating from outside sources, during layover. Harrison seamless finned tube radiators are fitted into the roof of each unit, with Harrison oil coolers. Each of the four sections has a fuel capacity of 1,200 gallons, or sufficient for a normal locomotive mileage of 600 in level country or as high as 800 miles with lighter loads, without refuelling. Cor-Ten steel air bottles for braking air, 2 x 5 ft., are carried underneath each section. Automatic sanders, #8EL brake equipment, copper tubing for air lines.

In the engineer's cab, we find automatic windshield wipers, electric heaters, soundproofing, softly upholstered seats and the complete automatic locomotive and Diesel engine control system and alarm system used in EMC passenger locomotives.

Because of the heavy starting loads, the transition operation is manually controlled by the engineer, with four motor connections, marked on a gauge, with different spacings for increasing or decreasing loads, series parallel, series parallel shunt, parallel and parallel shunt. The controller has eight operating positions. The engineer controls the entire operation of the locomotive from his stand, with a duplicate individual engine control station in each of the four cabs which are inspected by the helper. The 5,400 hp. 4-unit locomotive developed in excess of 200,000 lbs. tractive effort at seven miles per hour, dropping to approximately 40,000 lbs. at 40 miles per hour, and 25,000 lbs. at 60 miles per hour.

During the past summer and fall, the original No. 1 EMC freight locomotive made a 90,000 mile test run on twenty different railroads, from the Atlantic to the Pacific Coast. Generally speaking the locomotive hauled more tonnage, at higher speeds and with less fuel cost, than any other type.

At twenty miles per hour, the locomotive developed 70,000 lbs. tractive effort, or more than the maximum output of the heaviest non-articulated steam locomotive. On a 25 mile stretch of 1.42% grade on the Denver-Palmer Lake section of the Denver, Rio Grande & Western, the locomotive hauled 2,291 tons at 21 miles per hour, and developed 97,900 lbs. drawbar pull at seventeen miles per hour. Between Pueblo and Colorado Springs, a pull of 197,000 lbs. at seven miles per hour. From 25 to 50% more tonnage could be carried in each train over this section. No loss of power was noted over Tennessee Pass in the Rockies, where the line attains a 10,200 ft. elevation.

Two miles east of the Moffatt Tunnel, a 2% grade was negotiated at eighteen miles per hour with 1612 trailing tons. The absence of smoke in the Moffatt Tunnel was a notable benefit.

On the level the locomotive hauled 112 cars with 7166 trailing tons over a 155 mile division in 4 hours and 20 minutes, averaging 35 miles per hour, and attaining a top speed of 60 miles per hour. The record made showed 240,000 ton miles per hour moved, a new "high" for locomotive performance.

On the B. & O., a 91 car train was carried up a 1.52% grade at 15 miles per hour, with a 2526 ton load. On the Santa Fe a 25 mile stretch of 2.35% grade was negotiated with 1780 tons and 36 cars, at 16.2 miles per hour. Averaged tests for the 90,000 mile testing period showed a fuel consumption of 1½ gallons per 1,000 ton-miles, and 6-8 gallons per locomotive miles. At the high figure of 8 gallons per mile, the locomotive would operate 600 miles without refuelling. Coal per 1,000 ton miles would cost twice as much.

Lubricating oil per locomotive mile costs 3 cents. Oil is changed every 17,500 miles and a refill of 75% reclaimed oil and 25% new oil is put in.

One more phase of this remarkable locomotive, about which little should be said, and about which few will talk, is the regenerative braking idea that will go out on the Santa Fe for its first big test—a workout to lead to permanent adoption or complete discard—one of those experiments Railroaders like to discuss after it is all over and done!

It has long been known that the greatest problem about getting a heavy freight train over a mountain range is not the uphill pull, but the screaming, white hot process of braking the train as it roars down the other side. Electrified railroads, the Milwaukee in particular, have long employed regenerative braking to get the trains downhill. The controllers are reversed and the traction motors simply use the power of the descending train to put electricity back into the trolley, thus saving wear and tear of perhaps 400 pairs of brake shoes and power to compress the braking air.

EMC will install a new version of regenerative braking on the Santa Fe order to be taken afar and given "the Works" in their Western Mountain runs. If it is a success, the idea will go into all their locomotives. If it isn't, the idea will be scrapped and forgotten. Chances are 90 to 100 that it will work wonderfully.

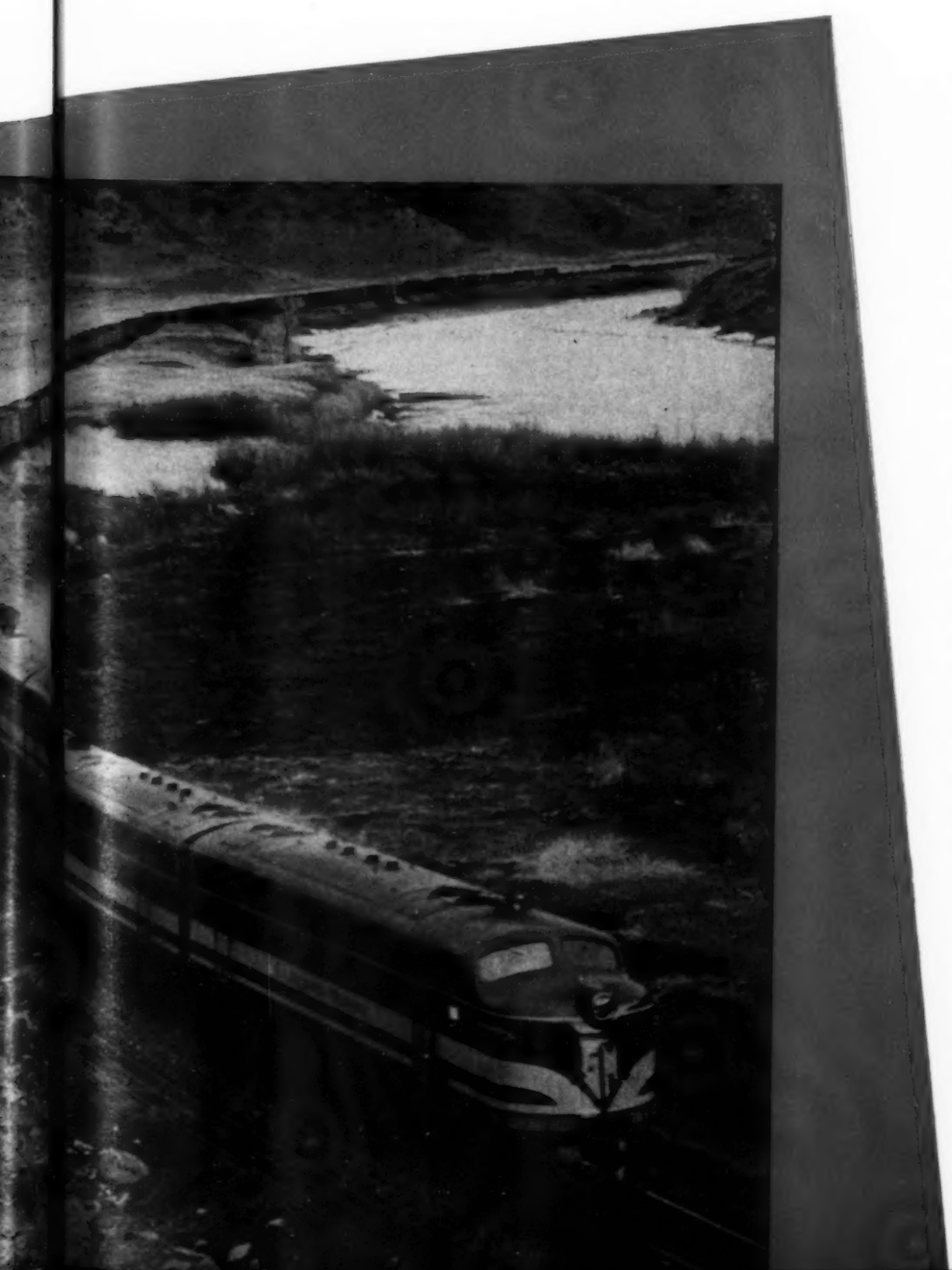
Into the middle of the roof of each of the four sections of the locomotive will be built a series of twenty-four heavily wound electric heaters, capable of high overload. When the freight train hits the top of a hill and starts down, a flip of a lever at the engineer's stand converts each traction motor into a D.C. generator.

The current will flow into these heaters and turn them white hot—white hot, were it not for powerful vertical fans that will force air from inside the air chamber next to the radiators, through the heaters and to the outside. Here in these banks of heaters will be dissipated the heat normally emanating from 400 pairs of brake shoes, and it will be possible to run downhill without touching the airbrake system except to come to a full stop.

The downhill operation will be kept to about 15 miles per hour, which means that about 3,500 kw. of heater radiation must function to hold a 3,000 ton train against a 2% grade. The units are very light and heavily wound to assure maximum heat effect, or load absorption per unit. The air blast will keep them from melting off and falling through the roof.

With smooth, powerful operation uphill, and smooth, simple operation downhill, the EMC Diesel locomotive will herald the end of electrification of railroads in America. Not even the Pennsylvania between Harrisburg and Pittsburgh can justify electrification in the face of the EMC freight locomotive showing, and the comparison will be even more odious if Diesel locomotives can adopt regenerative braking successfully.

A new era in World transportation began in America in February, 1941.



DEER ISLAND GRANITE

By ART MICHEL

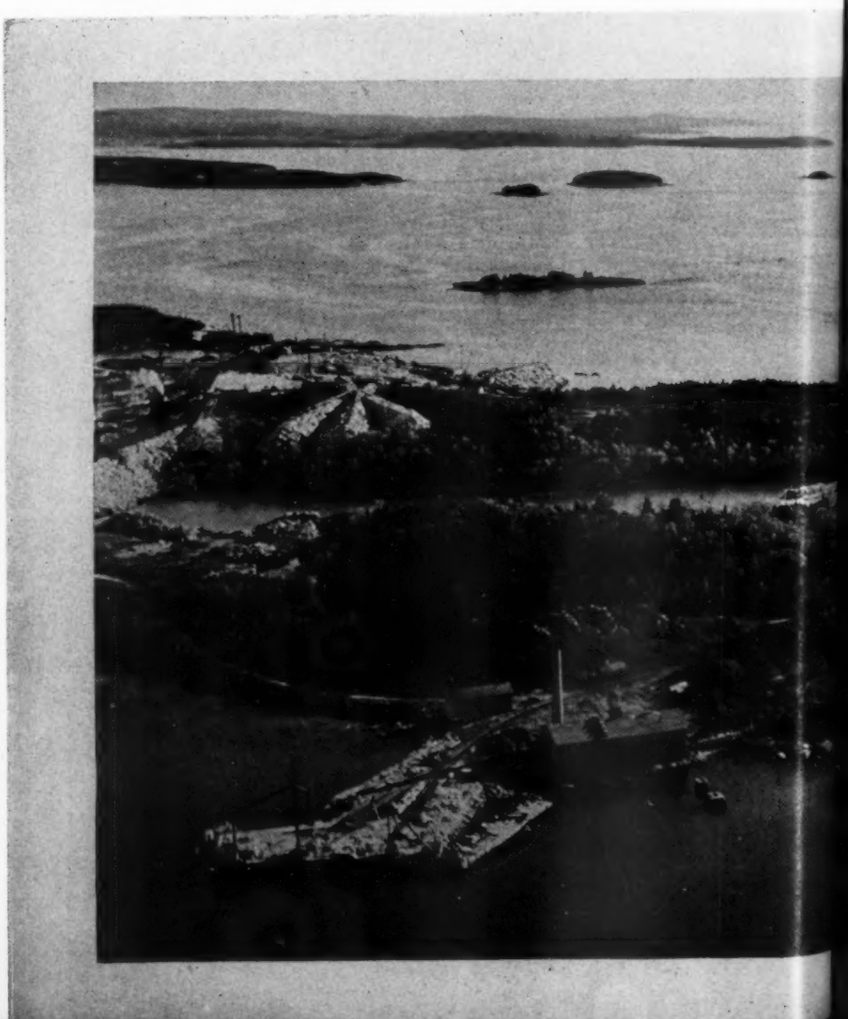
TWO hundred miles north of Boston, and twenty miles out at sea, lies Deer Island in the archipelago that edges the coast of Maine and the Maritime Provinces. On Deer Island, the village of Stonington thrives as a fishing center, and its tidewater lagoons have been known to harbor at one time nearly a million pounds of renowned Maine lobsters. Every working day morning small ferries put out from Stonington to cross the narrow strait that divides Deer Island from its satellite, Crotch Island. These ferries transport the men who work on the smaller island, where immense natural resources have produced two of the largest granite quarries in the world. It is a geologic treasure house that has been worked for no one knows how long, and it is yet a century or more away from exhaustion. A century or more, despite the fact that one quarry, slightly the larger of the two, has already yielded its owner, the Deer Island Granite Company, more than 1,500,000 cubic feet of granite in the past fifteen years.

Organized in 1924, succeeding the earlier owners of the quarry, the Deer Island Granite Company has each year continued to deliver more stone to supply the great construction projects of the Eastern United States. From this isolated island, by barge and rail, came the granite for such cosmopolitan structures as Radio City, the George Washington and Triboro Bridges, and a thousand smaller bridges across superhighways of New York and Connecticut. And, 50 years ago, Grant's Tomb and Riverside Drive were built with this same stone from the coast of northern Maine.

Year by year Diesel engines have played an increasingly important part in the successful operations of the Deer Island Granite Company. The story of the Diesel in the granite industry has never been fully told. Surely the job it performs here, in terms of power delivered and economies effected, is one of the best that could be told.

Look at Deer Island Granite's properties from the air. At the upper left you see the quarry and the spars of the giant cranes. From the quarry, through the woods at its right, runs the Company's own railroad, towing or pushing on flat cars the rough granite blocks. The tracks run around the lake in the center and on down to the cutting shed, lower right. After the stone is sawed into smaller blocks and planed, the train picks it up again and delivers it at the loading wharf at lower left.

Now, consider the power requirements in this unusual industrial plant. Have you ever tried to cut granite from the hillside smoothly and quickly? Pneumatic drills and channel bars are used to perforate the stone at intervals of 4″, and then wedges are hammered into the perforations until the block is broken away. With the stone cut away, big derricks swing into action to load it on cars. On its arrival at the cutting shed, the stone is distributed by the electric overhead cranes to the big gang saws which cut the stone to size. These saws are run by electric power. Into their slotted blades drops steel shot from overhead tank. The shot bite into the stone as cleanly as you would bite a banana. At every sweep of the saw, the shot spills into the shot pit and is retrieved by motor driven pumps and is returned once more to the overhead tanks. On smaller pieces a carborundum saw may be used in place of the gang saw. These carborundum saws, also operated electrically, rotate a carborundum disk through the granite. Generally, when the entire block is to be used so that it is entirely concealed from view in the finished structure, all sides of the block are finished by the saws, leaving the relatively smooth surface that is necessary for well laid masonry. But if one side is to be exposed to view, a surfacing machine, adjustable to produce different degrees of texture, is used to give the stone the well known sturdy roughness. Whatever the method of finishing the stone after it leaves the cutting shed goes



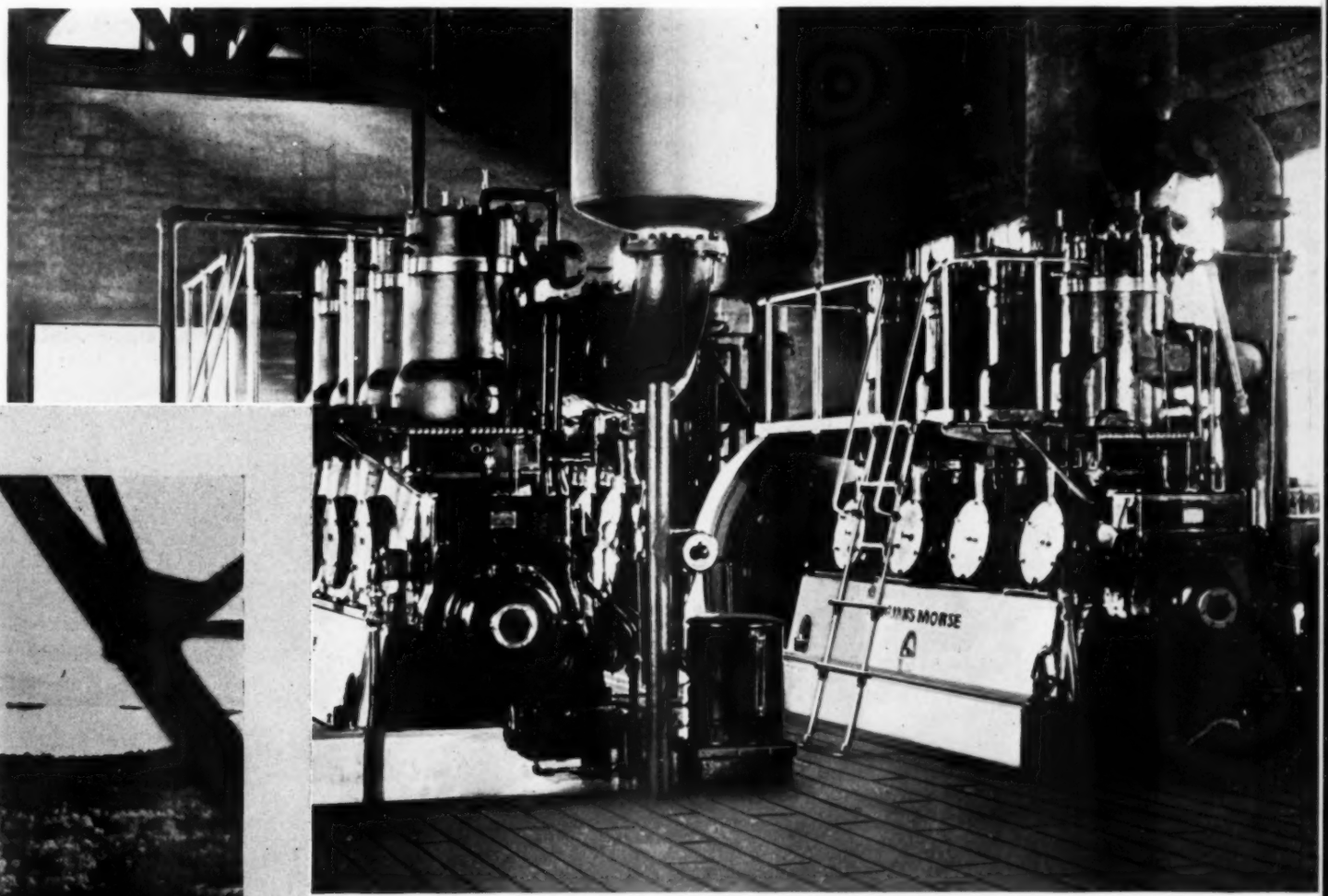
to the loading wharf for its long journey down the seaboard to New York and way points.

Now the power house. Built of granite and resting on granite, the height of an ordinary three story building and more than one hundred feet long, this structure has housed the power plant of the company through all its stages of development. From the turn of the century to 1918, a huge steam plant occupied nearly all its space. Then, in 1918, this steam plant was requisitioned by the Government and shipped away on lighters. After the war, Frank and James McGuire acquired the property, forming the Deer Island Granite Company and again began using only steam for power.

Then, in New York City, in the middle of the 1920's, a new subway was completed. Two Fairbanks-Morse Diesels, of 4 cylinders each, had been used twenty-four hours a day for three years in the building of this subway, and when their job was done there, they were freighted up to Maine, across the water to Deer Island, and installed as the first of the Deer Island Granite Company's present Diesel plant.

These two Diesels met that test. At 240 hp. each, one driving a 1300 cu. ft. compressor, and the other a 160 kw. generator, these engines proved to the McGuires that Diesels were more reliable and far more economical than any other power source. When, therefore, the Company later had the opportunity to obtain three additional Diesels taken from a construction project in Poughkeepsie, it further replaced steam equipment with more Diesels. Of five engines, four were being used for compressed air and one for generating electricity, in addition to which some steam equipment was used.

The two F-M Diesels below deliver a total of 480 horsepower for air and electrically-operated quarry machinery. Lower right: Aerial view, by Wide World Photos, Inc., of the Triboro suspension bridge, New York.



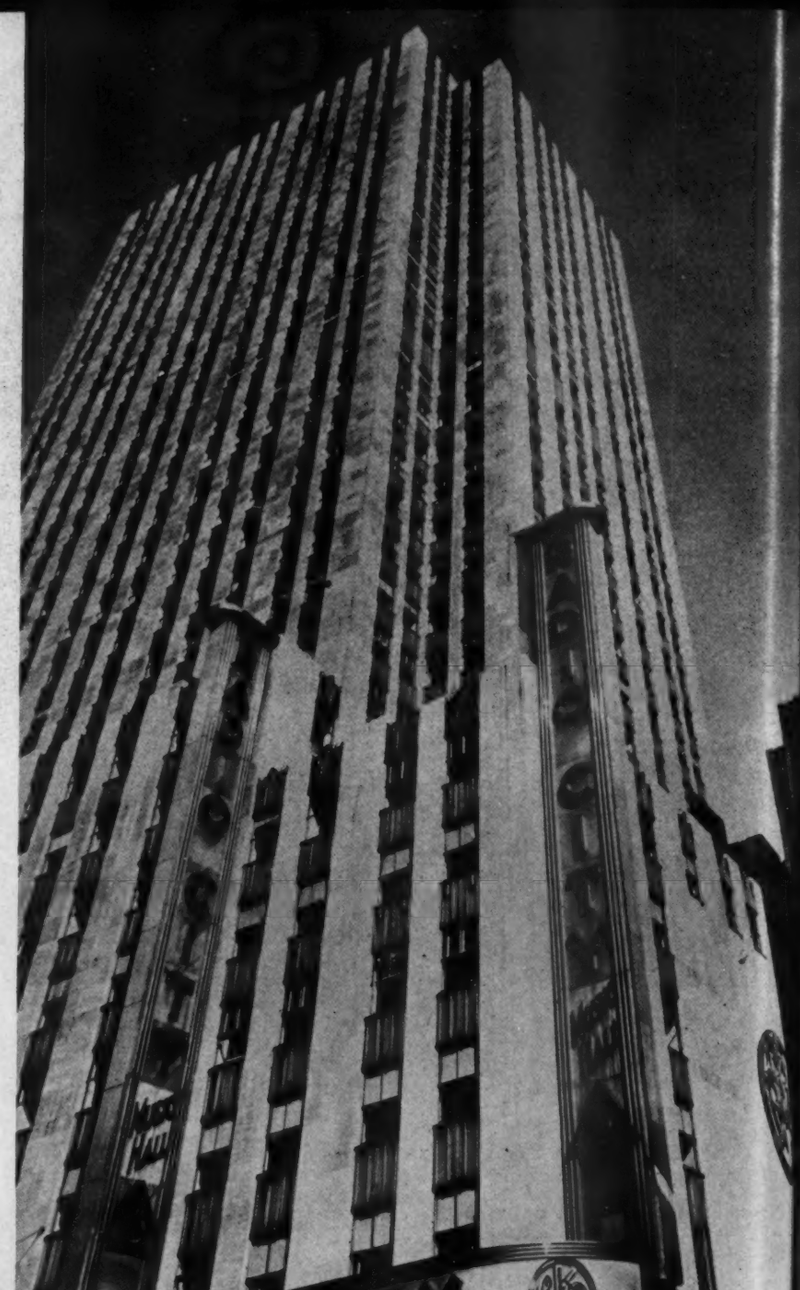
Aerial view of Deer Island Granite Company properties. Photo by H. Kratovil, Brooklyn, N. Y.

Sketch map showing location of Deer Island with respect to the Maine Coast.

There was still not enough power, even with four Diesel-driven and two steam-driven compressors, and one Diesel and one steam generator. Early in 1940, therefore, a new 300 hp. Fairbanks-Morse Diesel replaced the steam generator. This new Diesel is connected to a generator formerly used with the steam engine. Needless to say, the owners now wish to modernize their second original engine as soon as it can be spared long enough and then both of these engines, seventeen years old, will compare favorably with their newest Diesel. In the powerhouse are three Fairbanks-Morse Air Compressors, which provide starting air for all six Diesels. Here also are two F-M Circulating Pumps, driven by F-M motors, for cooling the Diesels. Extending from the powerhouse are the huge compressed air mains.

Now, if you ride the Company's 65-foot twin screw ferry back to Stonington, you see more F-M Diesels, two 40 hp. marine engines. These Diesels were recently installed in the same hull which was at one time used to bring help and food to the winter-bound island residents along the seaboard.

The steam engine that was replaced in the power house by the newest Diesel had an operating cost of around $25 a day. The Diesel costs $5 a day to run. The steady swing of this company to Diesels makes it evident that such economies have taken place progressively as the Diesel plant expanded. In this far outpost of industry, the Diesel has proved itself and its reputation.



The R.K.O. building, towering above Radio City Music Hall, New York, is faced with Deer Island granite.
View by Wide World Photos, Inc.

View showing the George Washington Bridge and East approach.
Photo by Underwood & Underwood News Photos

Off-shore sport fishing cruiser, all Diesel equipped.

"GOLDEN ARROW"

By WARREN GLEASON

A YACHTSMAN whose fuel expense may run from fifty to one hundred dollars for a day's cruising is entitled to ask himself if he is getting full value received, if he is being rewarded with the due measure of speed and performance which this class of expenditure would definitely merit.

Every hull has its potential speed inevitably determined by its form, displacement, construction, streamlining of superstructure, and other factors which may impose limitations upon speed beyond which the hull cannot be driven. A certain amount of power is needed to attain this maximum speed; beyond this point, the use of further power is wasted in producing waves, sinking the stern and other manifestations of throwing money away.

The yacht *Golden Arrow,* owned by Mr. C. Whitney Bouden of New Orleans, Louisiana, is a substantial off-shore cruiser, well suited for deep-sea sport-fishing. Built for strength and seaworthiness, her frames are oak and her planking is 1½" mahogany. No expense was spared either in construction or equipment of this interesting craft.

The original power plant consisted of a pair of fine gasoline motors of a well-known make, of 275 hp. each, a total of 550 hp. The hull of the *Golden Arrow* measures 46.2′ in length, with a beam of 12′ 8″ and a draft of 3.5′, and is of 35 tons gross and 17 net. This hull did not respond satisfactorily to the considerable power installed.

After a thorough trial by several years of operation, it was decided to repower this yacht with Diesel engines. Through the Mechanical Equipment Corporation of New Orleans, a pair of MRA-6 Superior Diesels was installed. These engines develop 110 hp. each at 1800 rpm. and are fitted with Joe's 2:1 ratio reduction and reverse gears. A closed system of fresh-water cooling is built in.

Operating at engine speeds of 1500, a boat speed of 12 mph. is attained; this figure increasing to 14.5 mph. at full throttle of 1800. This maximum speed of 14.5 mph. compares favorably with the best ever obtained with more than double gasoline power; the hull and power plant are now balanced as they should be. As to operating cost, the owner reports that his Diesels drive the yacht for $.75 per hour; the cost of the former gasoline fuel was $9.00 per hour; and furthermore, that this saving is achieved with no appreciable reduction in speed and no loss in maneuvering ability.

Additional details of equipment aboard *Golden Arrow* are interesting. A 32 v., 1½ kw. Witte Dieselectric auxiliary generating set mounted on Korfund Vibro-Isolators supplies all electrical needs, including lights, electric toilets, electrically driven bilge pump, circulating water pump, Curtis air-compressor for the ship's air-horn, and charging the Exide batteries. Twin rudders are used; shaft strut bearings are fitted with Goodrich rubber bearings.

All tanks, both for fuel and the 250-gallon fresh water tank, are of stainless steel. Fishing chairs are built into the after cockpit, with a harpoon pulpit mounted on the bow. With her operating cost reduced four-fifths and her increased cruising radius—another considerable advantage resulting from the fuel change-over, *Golden Arrow* is now well able to fulfill the purpose for which she was intended.

Interior view showing three of the Diesel generating units. Insert, the new F-M 6 cylinder Diesel and generator.

BERLIN, MARYLAND

By WILLIAM H. GOTTLIEB

EARLY in its fourteen years of Diesel operation, Berlin, Maryland, selected an engine of sound, dependable design. In the ensuing years, standardization of the plant on this design has meant operating efficiency and a never-failing annual cash surplus.

This Northern Maryland community (population 1,637 in the 1940 census) has operated its own power and light system since 1906, but it was not until 1926 that it began to use Diesels as prime movers. The first acquisition was a 150 hp. Foos Diesel, no longer manufactured. It was a three-cylinder engine of 12 inch bore and 18 inch stroke, turning over at 277 rpm., directly connected to a 90 kw. Westinghouse generator and exciter.

Diesel accessory equipment employed with original installation makes an interesting comparison with present practice. City water was run directly through the cylinder jackets and then wasted. Screens in the sump were depended upon to remove impurities from lubricating oil. There was no pyrometer to measure exhaust temperature. Exhaust gases were discharged without benefit of silencers and, consequently, operation was noisy. Before starting the engine, it was necessary to pump up fuel pressure by hand.

Increased demand, within two years, suggested to Berlin officials the need for an additional engine. It was at this point that the city purchased a Fairbanks-Morse Diesel and thereby set the pattern for the next twelve years of Diesel operation. This two-cycle, mechanical-injection engine was a two-cylinder model of 14 inch bore and 17 inch stroke, developing 120 hp. at 257 rpm. Fairbanks-Morse also supplied a 72 kw. alternator and direct-connected exciter.

The engine had many of the basic elements of later Fairbanks-Morse Diesels. It operated on the two-stroke cycle principle and employed crankcase scavenging. Lubricating oil was distributed by a multipoint Madison-Kipp mechanical lubricator. At that time, a two-stage cylinder head was used, the fuel being sprayed into a precombustion chamber where initial ignition took place. Fuel pump and injection nozzle were of light and simple construction, supplying a coarse spray of oil at comparatively low pressure, for the primary combustion in the chamber was depended upon to vaporize the fuel charge and discharge it into the cylinder.

The plant as a whole still managed without a closed cooling system, but there were evidences of progress in other directions. A Purolator filter, mounted beside the lube oil tank, cleaned the lubricant for the F-M engine. Exhaust gases were routed into a concrete conduit down under the engine room floor, then into a vertical iron pipe running up through the roof. This was a distinct improvement over direct discharge of the exhaust, but there remained ample room for further betterment.

In the past five years, Berlin has purchased two additional Fairbanks-Morse engines of modern design as well as auxiliary equipment that promotes efficient and economical operation. The first of these two acquisitions came in 1937 in the form of a four-cylinder, 14 by 17 inch unit, developing 300 hp. at 300 rpm. The latest Diesel was a six-cylinder, 450 hp. machine of the same speed and cylinder size. Both engines drive F-M alternators with direct-

Exterior view of the Berlin plant.

connected exciters. As indicated previously, the new Model 32 E resembles the older engine in basic design. The two cycle principle is maintained in conjunction with improved back-flow scavenging. Madison-Kipp lubricators supply lube oil to both cylinders and bearings.

The two-stage combustion system has been abandoned in favor of direct injection of the fuel into the cylinder. To provide the necessary fine oil spray, a heavier fuel pump capable of higher pressure is provided, as well as a spring-loaded, multi-orifice, differential spray valve. Direct high-pressure injection brought an improved mixing of fuel and air, more complete combustion and, consequently, improved fuel economy. Other results included a lower mean cylinder temperature, which meant lower exhaust temperature, smaller demands on the cooling system, and improved lubrication.

The Baltimore, Chesapeake & Atlantic Railroad passes the rear of the Berlin plant and it is possible to unload the Gulf No. 2 fuel by gravity from tank cars to the 10,000 gallon storage tank. The oil flows from storage to the four day tanks (one 300-gal., two 200-gal., one 100-gal.) again by gravity. Fuel is drawn to the engine reservoirs by automatic built-in supply pumps. Edge-type filters keep fuel oil clear of impurities. Woodward isochronous governors regulate the fuel pump suction valves of the newer engines. The Texas Company's Algol oil is used to lubricate all four engines. Purolator filters are included in the lubrication system of all three Fairbanks-Morse units.

The F-M engines are now cooled by a closed system. Jacket water is circulated through the ample jackets around cylinders and cylinder heads and then through Harrison heat exchangers. Raw water passes from the heat exchangers to a Marley cooling tower of the spray type. City water is used for makeup. There is an F-M centrifugal jacket water pump for each engine, and two pumps for the raw water. All are motor-driven.

Exhaust temperatures of the two latest F-M units are measured by Alnor pyrometers with selector switches. The exhaust headers of these engines run out to vertical Maxim silencers outside the rear wall of the plant. All the engines are equipped for air starting. In 1926, when the Foos Diesel was installed, a Worthington compressor belted to a 5 hp. Westinghouse motor was provided to supply starting air. This proved adequate until 1937 when a Fairbanks-Morse compressor and motor were added. A fourth air bottle was added to the three of the original plant.

The Westinghouse switchboard contains ammeters, voltmeters and synchronoscope supplied by the same company as well as voltage regulators for the Foos and the original Fairbanks-Morse. Allis-Chalmers voltage regulators of the rocking contact type are provided for the two large F-M engines. The alarm system, product of the Marshalltown Mfg. Co., sounds a warning horn when the water pump fails. An additional alarm sounds if water temperature rises too high in the 450 hp. engine.

A. P. Christopher, City Manager of Berlin, reports several advantages of standardizing on the Model 32 design. Since the basic design has not been altered and all cylinders are of the same size, parts are interchangeable. In consequence, only a small inventory of spare parts is necessary. Engineer Hampton Vickers and the other members of the three-man operating force credit the standardized F-M plant with ease of operation. This element is inherent in the engine design and has a cumulative value. A third advantage is the possibility of modernization. Thus far, Berlin engineers have been content to operate the old F-M engine in its original state, but it is possible to modernize the unit with relatively few changes to make it the equivalent in most respects to a 1940 model.

The story of the Berlin power plant system has been one of diminishing rates and increasing consumption. Here, in brief, is the story of the growth of kilowatt hour production during the last ten years of Diesel operation:

Year	Kilowatt hours produced
1930	376,900
1931	429,500
1932	451,600
1933	449,100
1934	487,500
1935	542,300
1936	610,400
1937	687,700
1938	728,700
1939	896,100

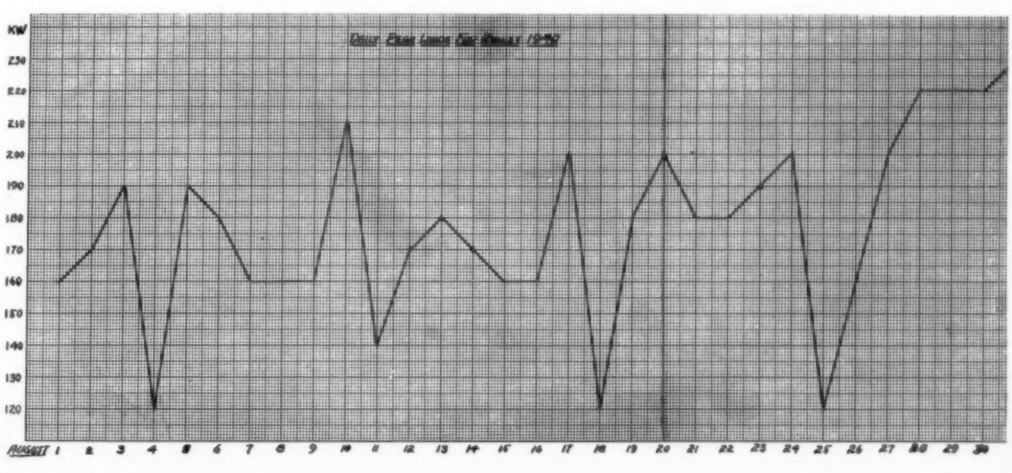
During the first eight months of 1940, kilowatt hour production has been 572,700, a gain of 32,900 over the corresponding period of 1939.

The load is variable, only rarely reaching a peak of 300 kw. Much of the time the load runs at so low a level that the newer, larger and more efficient engines cannot be used with peak efficiency. Thus, in the month of August, 1940, the 450 hp. engine produced 32,100 kwh., but since the load in that month never exceeded 230 kw., the engine was never fully loaded. The 300 hp. unit was called on for a major portion of the work, producing 40,200 kwh. for the 31-day period. Because of load conditions, however, it was found advisable to use the 150 hp. Foos to produce 11,500 kwh.

In spite of the low load factors there has been a continual improvement in operating records. In 1938, the first full year in which the 300 hp. Diesel carried a share of the load, Berlin engineers report 11.39 kwh. per gallon of fuel. In 1939, with the new 450 hp. engine taking part of the load, kilowatt hour production per gallon of fuel rose to 12.19. With the two new engines taking a major portion of the load, Berlin expects further improvement in 1940.

The city finds itself traveling in a happy cycle.

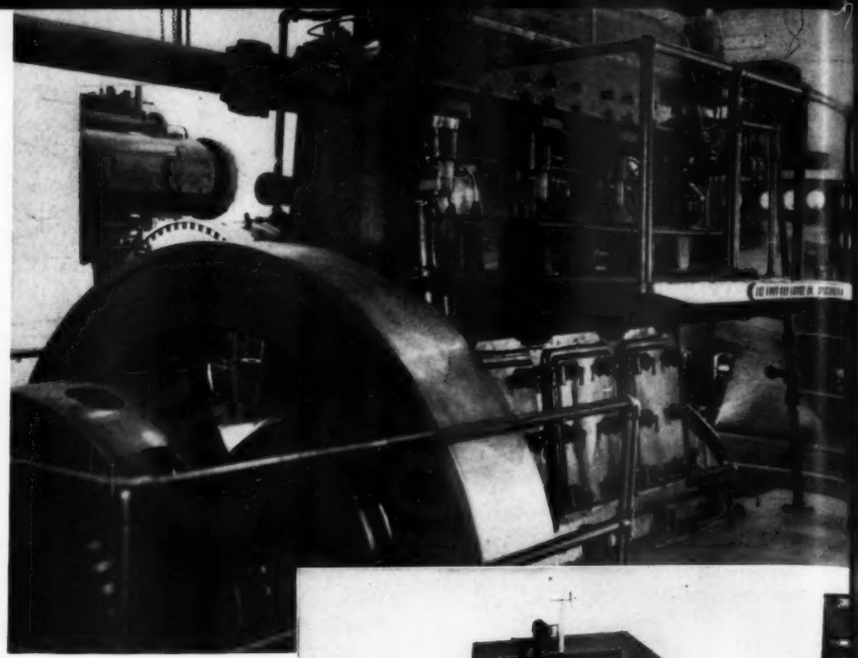
Chart showing daily peak loads during August, 1940.



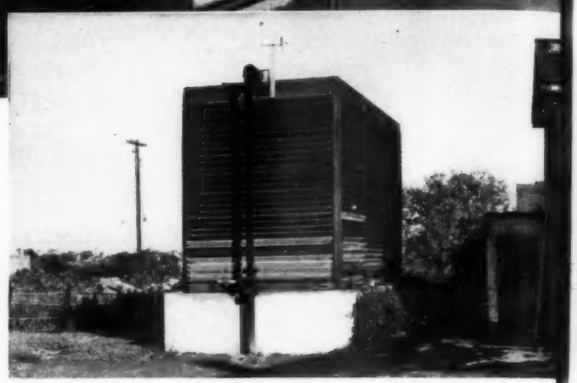
Diesel economy permitted reduction in rates to consumers which in turn resulted in increased consumption. The resultant rise in kilowatt production brought greater economy and permitted further reduction of consumer rates. There is another important element in the cycle: financial solvency allowed the installation of modern, efficient engines which further reduced operating costs.

On January 1, 1940, the total investment in the Diesel plant (including the distribution system) stood at $113,635.99. The total outstanding indebtedness of the light department was only $11,360.58. A glance at the statement of revenue and expenditures for the year of 1939 will explain the city's sound financial condition.

Electric Revenue and Expenses		
Rent from transformers leased	$33.33	
Merchandise sold	48.04	
Current sold homes and business	27,711.34	
Current sold street lights	827.34	
Current sold water department	1,139.60	
		$29,659.51
Production Expenses		
Plant salaries	$3,111.92	
Plant repairs	279.83	
Insurance	44.41	
Fuel, 73,466 gal.	3,741.30	
Lube oil, 1,336 gal.	410.21	
Supplies	80.79	
Misc. plant expense	13.35	
	$7,681.81	
Operating and Distribution Expenses		
Maintenance city truck	$133.95	
Fuel office (rent)	170.17	
Labor repair electric lines	683.49	
Material	545.68	
Insurance	40.00	
Office salaries	1,034.67	
Office supplies and expense	151.73	
Legal	25.00	
Lineman telephone	18.58	
	$2,803.27	
Total Operating Expense		$10,485.08
Net Operating Profit		$19,174.43
Electric bonds paid	$333.34	
Interest on electric bonds	416.66	
Operating Surplus		$18,424.43
Reserved for depreciation	$6,332.46	
Net Surplus		$12,091.97



The original Diesel at Berlin; a three cylinder Foos engine, using gas fuel, installed in 1926.



The Marley spray tower which cools the raw water.

One of the major services a power plant can give its community is continuous, dependable service. The Berlin plant has never had a breakdown. Intelligent supervision is an important element in the record of any plant. Engines in Berlin get a thorough overhauling once a year, and oftener if there is any reason to suspect trouble.

A second major service is provision of electric power at low rates. In 1928, when the first Fairbanks-Morse Diesel was installed, the rate per kwh. for the first ten consumed was 13 cents; the next 50 sold at 10 cents; the next 100 at .09; next 200 at .08; next 300 at .07; next 400 at .06; next 600 at .05, and all over 1660 at .04. Residential, commercial and industrial consumers all paid the same rate.

On January 1, 1932, the rate was slashed drastically. The first ten kwh. sold at $0.12 per kwh., the next 100 at .04, and all above 110 at .03. A special rate of 1½ cents was instituted for water heaters with a time switch for off-peak operation. On January 1, 1940, a further rate reduction was put into effect. Under the new schedule, consumers pay .08 for each of the first 15 kwh., .03 for the next 200, and .025 for all over 215. Water heaters get current for off-peak operation at .01 per kilowatt hour. In spite of these rate reductions, City Manager Christopher reports a continually growing surplus. The lower rates bring greater consumption and actually higher total revenue.

A third service the plant has rendered the community has been the attraction of industry. In the Fall of 1938, a chicken dressing plant and a silk hosiery mill moved to Berlin, and assurance of an adequate, dependable supply of power at moderate cost was an important element in bringing the industries to this site. A shirt factory and fruit grading activities of a large nursery are also dependent on Berlin power. In addition, two produce-packing plants, an ice plant, a veneer works, and a wood products plant made some use of electric current from this source.

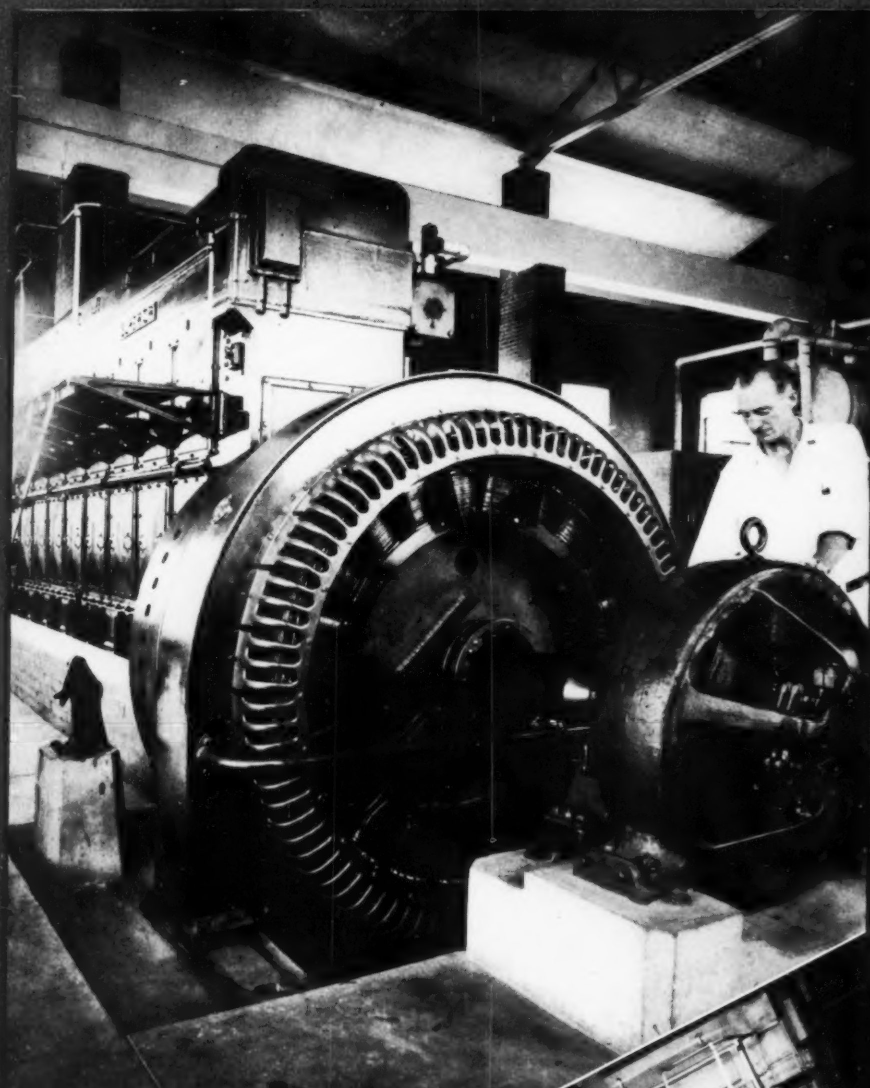
A direct contribution to the city by the power plant is the modern sewage system. Sewers and a sewage disposal plant were constructed at a cost of $106,000 without recourse to tax monies. The initial cost and retirement of bonds are borne entirely by the water and light departments. The light plant already has contributed $14,829.15. The light department regularly donates all current for six churches, the municipal building, city parking lots, boy scout building, state health clinic, firemen's carnival, Christmas street decorations and traffic signals. This amounted to 20,072 kwh. in 1939.

THE MEN BEHIND THE DIESELS YOU BUY

GEORGE WILLIAM CODRINGTON

General Manager, Cleveland Diesel Engine Div., General Motors Corp.

★ Born in Palatka, Florida, on December 22, 1886, he is the son of James W. and Catherine Flynn Codrington. Mr. Codrington was educated in Jacksonville, Florida, schools. In 1903, he was employed by the Jacksonville Ferry Company as marine engineer and, until 1912, he held similar positions with the R. C. Ross Company and the Galloway Coal Company. From 1912 to 1914, he was engineer on various ships. During 1914 and 1915, he was chief engineer on the yachts, "Everglades" and "Paragon." In 1917, he joined the Winton Engine Corporation in Cleveland, Ohio, as marine superintendent. He advanced to the position of General Manager in 1919, Vice President and General Manager in 1925, and President and General Manager in 1928. In 1930, General Motors Corporation acquired the Winton Engine Corporation, which became the Cleveland Diesel Engine Division, General Motors Corporation, in January, 1938, and Mr. Codrington continued with this Division as General Manager. In Cleveland, Mr. Codrington is a member of the following clubs and civic groups: The Union Club, the Mid-Day Club of Cleveland, Inc., and the Cleveland Chamber of Commerce. In New York, he belongs to the Union League Club, the New York Yacht Club, the Newcomen Society, the Transportation Club, the American Society of Mechanical Engineers and the Society of Naval Architects and Marine Engineers. In Washington, D. C., he is a member of the Congressional Country Club and the Metropolitan Club. Mr. Codrington holds directorates in the following companies: Addressograph-Multigraph Corporation, Cleveland, Ohio; National Acme Company, Cleveland, Ohio; Electro-Motive Corporation, La Grange, Illinois; and the Electric Boat Company, Groton, Conn. On January 21, 1914, Mr. Codrington married Ruth Sherwood. Their home is in Lakewood, Ohio. Aside from Diesel engines, Mr. Codrington has no pronounced hobbies. Occasionally, however, he finds time for a brief fishing or yachting trip.



The 770 hp. Superior convertible gas Diesel at Huntsville.

A GAS DIESEL ARTICLE

By ORVILLE ADAMS

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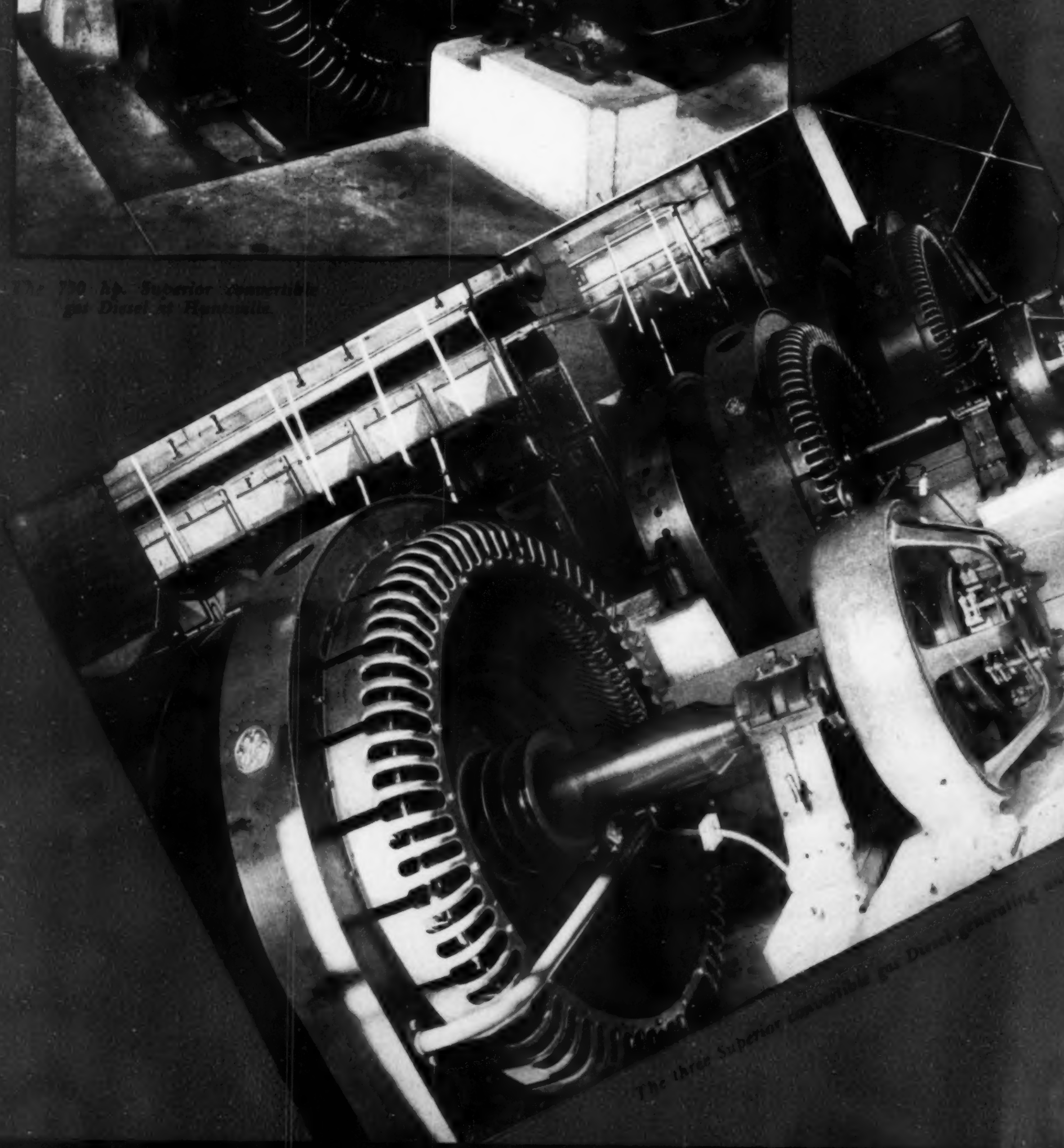


The three Superior convertible gas Diesel generating units totaling [illegible]

THE Texas State Prison system is generally self-supporting, and ably managed. It operates and derives its support largely from the operation of numerous industrial enterprises and large agricultural projects. The consumption of power per capita of the prison system is larger than for a comparative industrial community, hence the question of power is and always has been an important, if not a necessary consideration in the proper management of the system. Since the system required large quantities of steam for process work, heating, cooking, and the like, the matter of using internal combustion engines to produce the electrical energy did not receive consideration until a very recent time. Since the installation of a very considerable amount of new industrial machinery and the modernization of the machine shop, and complete electrification of the scattered farms and prison projects got under way a few years ago, the economical production of vast amounts of power became essential.

For obvious reasons, the operation of steam turbines and the construction of a large steam plant did not appeal to the practical minds of the management. Diesel and gas engines were considered for quite a while before decision was made to install this type of prime mover. Finally, three Superior, convertible Diesels, totaling 1635 horsepower, were selected to supply the total power and light requirements of the Huntsville Unit, which consists of the main Penitentiary at Huntsville, and the nearby Wynne and the Goree Prison Farms, by high lines, the Wynne Farm being about four miles north of the city of Huntsville and the Goree Farm about 3½ miles south of the city.

There are three generating units, comprised of convertible type Superior gas-Diesel engines, one a 325 hp. 5 cylinder engine having a 12½" bore, and 15" stroke, direct connected to a 225 kw. generator, and operating at 400 rpm., with direct connected exciter; one 560 hp. 12½" x 15", operating at 400 rpm., and direct connected to a 350 kw. generator; and one 750 hp. 8 cylinder, 14½" x 18", operating at 327 rpm. and direct connected to a 480 kw. generator. All alternators are General Electric with direct connected GE exciters.

This plant is fully equipped with a complete complement of auxiliary apparatus, which includes air filters, Alnor exhaust pyrometers, silencers, exhaust heat boilers, water softeners, Skinner lubricating oil reclaimers, and Nugent filters. Other essential adjuncts, which contribute to reliability and satisfactory generation of power, are Woodward isochronous governors, lubricating oil pressure and temperature alarms, a closed cooling system, Ross lube oil coolers, and Mercoid switches.

Since there is an abundance of fuel, both natural gas and Diesel oil, available from various Texas fields, the logical choice was the convertible type engine, which can be changed over to gas or oil with little difficulty and expense to use whatever fuel that time and conditions may warrant, thus insuring the possibility of operating on the most economical fuel available throughout the life of the plant. The engines at the present time are equipped for natural gas which is available at a very low rate and considered at this time to be cheaper than fuel oil for this particular location.

The cooling system is designed for the most efficient and reliable cooling, and consists of a Ross shell and tube heat exchanger located in the power plant building. The raw water supply is taken from a large sump and cooling pond located just outside the power plant building. The circulating water pumps located adjacent to the heat exchanger are below the engine room floor in a pit, with a pressure head on the suction maintained by gravity from the elevated reservoir.

The exhaust lines from the engines extend into the floor below to exhaust ducts which run horizontally to the waste heat boilers where a by-pass valve is located to deliver the exhaust either through the boilers or direct to Maxim silencers outside the building. The air intake system is through ducts from American air filters mounted on the walls of the building.

The switchboard is modern dead front type with all switchgear totally inclosed in locked compartments, all in one compact unit, consisting of generator and feeder panels, instruments, voltage regulators and automatic generator controls.

The lubricating oil is protected by means of the usual filters inserted in the pressure system, and is completely reclaimed by the use of a Skinner reclaimer, and the system includes an oil cooler and a filter.

The plant is in operation twenty-four hours a day. The small engine is able to carry the load to cover the low day load periods, and the medium size engine is connected to the line for the usual peaks, while the larger engine is sometimes used instead for unusual load. The maximum demand does not as a rule exceed fifty percent of the total capacity, thus ample standby is available at all times. The engines are thus able to operate at the most economical load and are alternated in accordance with this load variation, as a matter of routine.

The modern dead front switchboard.

The Huntsville, Texas, Prison System Power House.

Facts Gleaned From The Operation Of A Combined Diesel and Steam Plant

By R. L. GREGORY

Editor's Note: In this month's article, the author of this section, R. L. Gregory, Chief Engineer of the Hillsdale, Michigan, Municipal Water & Light Plant, discusses his own plant from the operator's viewpoint.

MANY of our smaller cities and towns, which have built power plants in recent years, have gone entirely to Diesel operation. Others, having good steam or hydro plants, have maintained them, but when additional equipment has been found necessary, have added Diesels, as standby and peak load insurance, possibly with the thought in mind, that as the old equipment wears out and becomes inefficient, it will be replaced by other Diesel operated units. There are still other plants, where the supervisory personnel feel that their plants require a combination of both types of equipment.

We are operating one of the few combined Diesel and steam plants in this section of the country. We have had many visitors, and are often asked by engineers and operators, who come into our plant, just how we determine the best method of operation to get the most efficient results. I may state that this has been a most interesting problem which has had a great deal of our attention but because of ever changing conditions, the answer has been arrived at by the "cut and try" method.

As these conditions vary, so must our method of operation. In order that I may more fully explain this let me give you a resume of the growth of our load and plant conditions:

The graph shown in Fig. 1 depicts the growth of the plant output for the calendar years of 1936 to 1941. The solid black line in this graph, represents the growth in kwh. output. The broken line represents the monthly peak loads over a similar period in kw. In a few instances, this peak load occurred on a single day of the month. This, however, was the exception and not the rule, for in most instances the peak remained the same for several days.

Using the year of 1936 as a basic year, the increase in kwh. output for 1937 was 22.6 percent, that for 1938 6.08 percent, for 1939 37.7 percent, and for 1940 64.22 percent over the basic year of 1936. This was a steady increase except for the year of 1938, when a falling off in local industrial activity caused less demand for power, with the resulting decrease.

Referring to the peak load curve and using also 1936 as the basic year, we find that 1937 witnessed an increase of 14.28 percent, 1938 an increase of 23.8 percent, 1939 an increase of 38.09 percent, and in 1940 it reached an all time peak and an increase of 69.05 percent over the basic year. It will be noted that while there was a decline in kwh. output in 1938 over 1937, there was an increase in peak load conditions. A sudden spurt in industrial activity near the end of the year was partially responsible for this condition.

In 1936, the plant was entirely steam operated. The equipment consisted of four Sterling type boilers, two of which were rated at 300 hp., one at 500 hp. and the fourth at 400 hp. All were operated at 160 lb. gauge pressure. The generating equipment consisted of four steam turbine driven units rated at 1500 kw., 750 kw., 625 kw. and 300 kw., giving a total rated capacity of 3,175 kw. The turbines all operated on 160 lb. steam, while the generators were 2300 volt, 60 cycle, 2 phase, 4 wire units, with 80 percent power factor. This equipment was all in good shape, with many additional years of service in view, but when you look at the load increase in 1937, it becomes apparent that additional equipment was needed. If the load were to continue rising, it would be impossible to carry it on the present equipment and allow for the removal of units for periodical checkup and routine maintenance. A complete survey of existing conditions and an estimate of future requirements therefore was decided upon.

When this data was gathered and the findings compiled it was carefully studied from every

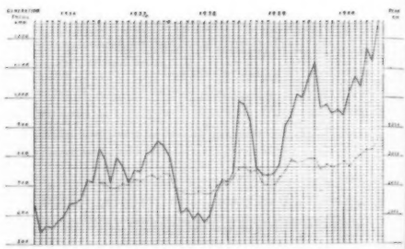


Fig. 1. Plant growth for five years.

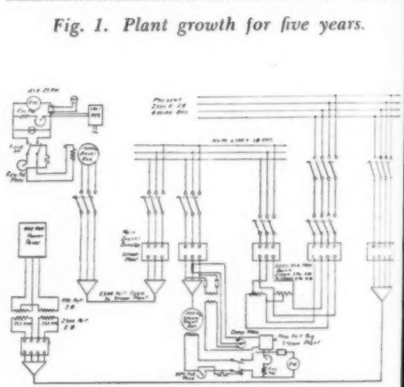


Fig. 2. Distribution Plan.

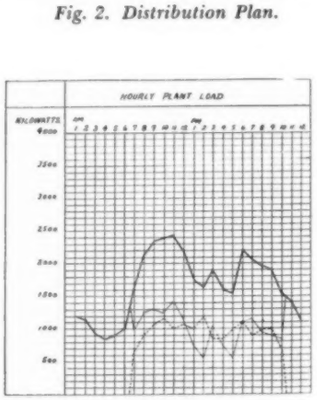
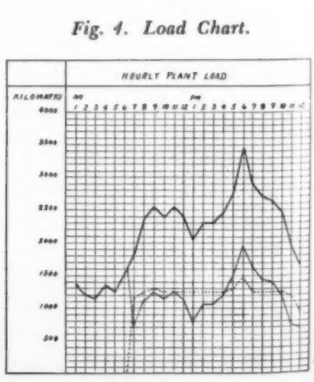


Fig. 3. Load Chart.

Fig. 4. Load Chart.



angle and eventually the following program was decided upon:

To purchase and install a Diesel driven unit of ample capacity to allow the removal of the largest steam driven unit from the line, and still maintain uninterrupted service with sufficient reserve capacity. The generating unit connected to the Diesel to be wound for 2300 volts, 60 cycle, 3-phase, 3-wire operation.

To rewind the 1500 kw. turbine driven generator, to conform with the characteristics of the Diesel driven generator.

To revamp the 500 hp. Wickes boiler, raise the operating pressure to 275 lb. gauge, for which the boiler was originally designed, and install a superheater to furnish 150 degree superheated steam.

To also check over the 1500 kw. turbine, to allow for operation on 275 lb. 150 degree superheated steam, for which it too was originally designed, and to operate this turbine and the 500 hp. boiler as a unit. The remaining three turbine driven units to maintain their original characteristics and to be connected directly to the 2-phase bus.

To build a new 3-phase distribution system, and change over from the old 2-phase system, as soon as time would permit.

This plan was approved by the electorate, and work started in 1938. Bids on the Diesel and equipment were taken, and it was finally decided to purchase a Nordberg two cycle, crosshead type, air injection engine, of 2250 bhp. rating at 225 rpm. This unit to drive a direct connected Allis-Chalmers 1500 kw. generator. It was further decided to build a new Diesel plant building adjacent to the present steam plant, and large enough to accommodate another Diesel in the future, if required. The construction on this building was started in the late fall of 1938, and the new unit installed the following summer, and put into commercial service in September, 1939.

Such a program presented several problems: The 2-phase distribution panels, with the switches and controls and the instruments were all located in the steam plant. By some alterations and additions to the equipment, they could all be used on the new 3-phase system, and thus lessen the cost of the changeover. Not only that, but by installing a new 3-phase bus, adjacent to the 2-phase distribution bus, and running the Diesel generator leads to the steam plant, the changeover could be accomplished much easier and with no service interruptions. The main oil circuit breaker was mounted in the steam plant, and the steam plant operator would do the synchronizing with the steam plant units. In order to accomplish this, a control circuit was run from the Diesel governor to the Diesel machine panel in the adjacent steam plant building.

It was also necessary, however, that the Diesel operators have emergency control over the main breaker, in case anything should go wrong at the Diesel plant. This was accomplished by running an emergency trip circuit from the Diesel plant board to the main breaker in the steam plant. A duplicate set of wattmeters, ammeters, and voltmeters was installed on both Diesel and steam switchboards.

In order that the Diesel driven 3-phase unit and the 1500 kw. turbine 3-phase unit could supply energy to the old 2-phase distribution system, it was necessary to provide a set of Scott connected transformers between the 2- and 3-phase bus, and a protective breaker placed between the transformers and each set of bus. This, of course, was a temporary arrangement provided until all distribution circuits could be transferred to the 3-phase distribution bus. This made a flexible system, inasmuch as the 3-phase units could energize the 3-phase bus direct, and also the 2-phase bus through the transformers. At the same time, the remaining 2-phase units could energize the 2-phase bus and also feed back through the transformer bank onto the 3-phase bus if this should become desirable.

A new voltage regulator was supplied on both the Diesel unit and the 1500 kw. turbine driven unit. When these two units are operating in parallel, these regulators work in parallel. If either unit is off, the other operating unit does the regulating. If both units are off and the low pressure turbine driven units are operating, the voltage is controlled by the old steam plant voltage regulator from the dc. bus, supplying excitation from a motor generator set. Fig. 2 shows a general plan of the generator and distribution setup, the auxiliary controls being omitted in this drawing.

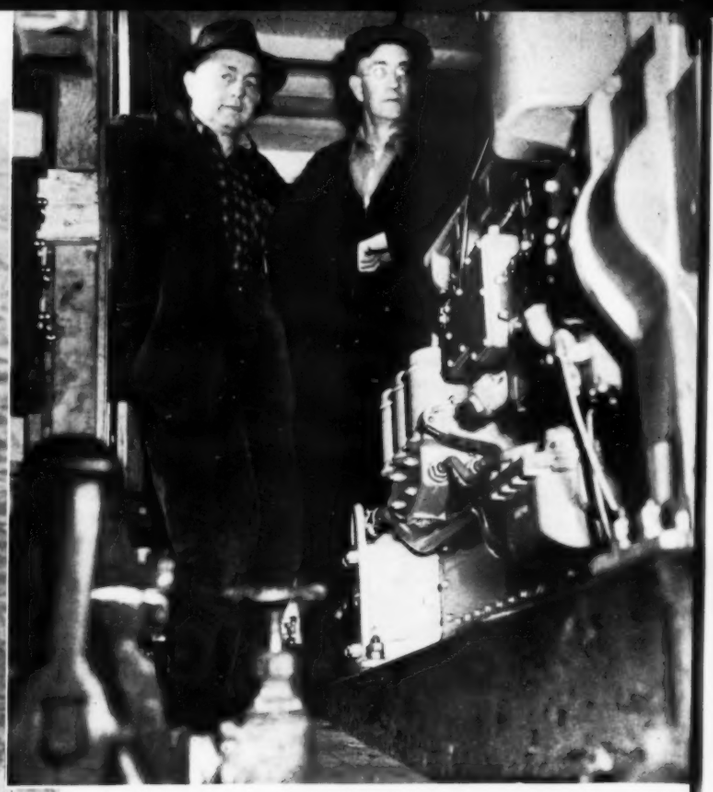
Now as to plant operation, several methods have been tried: first by letting the steam plant take the base load and the Diesel the swing on the peaks. Secondly, by letting both units operate and take their share of the swings; thirdly, by putting the base load on the Diesel and letting the steam plant take the swings. This method has proven the most effective. Fig. 3 and 4 represent a twenty-four hour load curve in which the heavy solid line represents the total load, the broken line the Diesel load, and the light solid line the steam plant load.

Fig. 3 represents the load as it occurred about a year ago, while curve No. 4 represents the load as it occurred in the middle of last December. Notice the change in the hours where the peak loads occur. In graph No. 3, the steam unit and Diesel were both taking the swings, while in graph No. 4, the Diesel was carrying almost a constant load, while the steam unit was taking the swing.

In Fig. 3, the Diesel had a load factor of 62.5 percent, and produced 11.2 kwh. per gallon of oil consumed, while the steam unit had a load factor of 65.27 percent and used 1.82 lb. of coal per kwh. In Fig. 4, the Diesel had a load factor of 77.2 percent and produced 12.2 kwh. per gallon of oil consumed while the steam unit had a load factor of 76.38 percent and produced a kwh. on 1.76 lb. of coal. Of course, the higher load factor as shown in Fig. 4 over that shown in Fig. 3, was partially responsible for the increased efficiency of the units, but we have found over a period of time, that we secure better efficiency all around by holding a nearly uniform load on the Diesel generating units and letting the steam plant take the swings in this particular setup.

When the Diesel was purchased, it was with the idea in mind that it would serve as a peak load unit and a standby. With the unlooked for increase in 1940, however, it became necessary to use this unit for about eighteen hours a day. We have often been asked why we don't operate the Diesel on a twenty-four hour a day basis and shut the steam plant down during the early morning hours. Experience has taught us that in operating a high pressure steam unit in conjunction with the Diesel, it is more economical to operate the steam unit on a twenty-four hour basis than it would be to bank the high pressure boiler for four or five hours and remove the high pressure turbine from the line.

There have been many angles to this problem not discussed in this article, but the basis for most of them have been the constant change in local plant conditions. We have found that by using this method of operation on our particular setup, we can maintain a systematic maintenance schedule on both the steam units and the Diesel and not interfere with service. Our methods of maintenance and maintenance records will be discussed in a future article.



Foster Bros., above, looking over the new Caterpillar marine Diesel recently installed in their sixteen year old "Imperial."

THE IMPERIAL REBUILT

THE "Imperial," a passenger-carrying Diesel vessel, was built in Bandon, Oregon in 1924 by the Herman Bros., and was constructed entirely of air-dried Orford Cedar. It was rebuilt at Columbia Boatyards in Astoria, Oregon, by Matt Tolonen in 1940, and at that time a 100 hp. Caterpillar Diesel marine engine and accessories was installed.

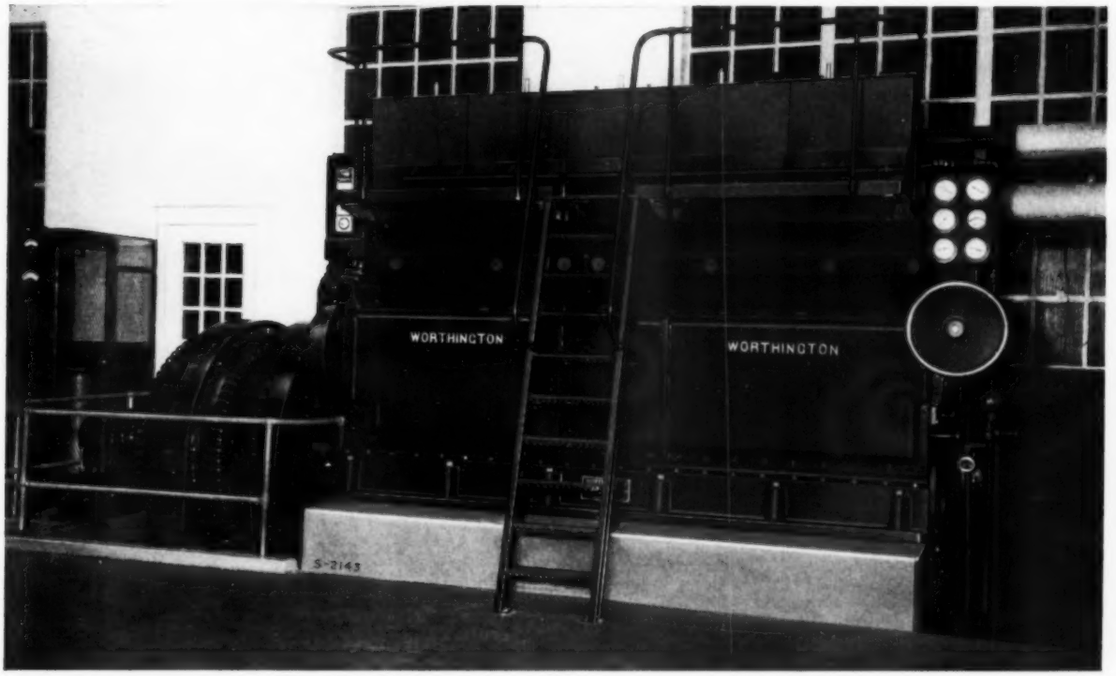
E. B. Foster of Foster Bros., owners of the vessel, has been a licensed engineer for steam vessels for the past twenty-five years and he tells us that as a result he can well appreciate the compactness of the Diesel installation. The 100 hp. engine furnishes all the power used on board. This includes the operations of a centrifugal fire and bilge pump, a generator for lighting, power hoist, and water for two toilets. Hot water from the engine cooling system is circulated through radiators to heat the pilot house and passenger cabin.

The "Imperial" is 64′ 3″ in length, has a beam of 15′ 6″ and a draft of 4′ 6″ aft and 2′ forward. A thirteen mile-per-hour speed is obtained with the D13000 engine, which replaced a 3-cylinder heavy duty Diesel, and adds three miles per hour over the former type of power. Pilot house controls consist of the standard Caterpillar throttle. The clutch is controlled from the pilot house by a worm gear and a series of levers.

Safety equipment on the "Imperial" is complete, and includes three water-tight compartments in the hull, one Balsa Wood life raft approved by the U. S. Steamboat Inspection Service, cork life belts for 43 persons, one foam-type, two acid and soda and two Pyrene fire extinguishers, and one Fairbanks-Morse double suction centrifugal pump with 300-gallon per minute capacity at 95 pounds pressure for fire and bilge service.

Mr. Foster performs the double duty of engineer and deckhand aboard the "Imperial" and his brother, Harry, is operator. The vessel makes one round trip daily, a distance of 6 miles, except Sundays and legal holidays.

Worthington Diesel and Gas Engines for Uninterrupted Power Service



CONTINUITY of service, now, more than ever before, is a production factor of prime importance

Such service is a matter of definite record in hundreds of Worthington engine installations, and in a wide variety of applications.

Further, in addition to continuity of service, operating economies will contribute substantially to future profits.

An expert WORTHINGTON engineering staff is ready to help you in the solution of your power problem, and to render a complete and qualified recommendation, without bias or obligation.

WORTHINGTON AUXILIARIES GIVE

added service security, through the undivided responsibility of one maker.

AIR COMPRESSORS FOR STARTING

CENTRIFUGAL PUMPS FOR JACKET WATER CIRCULATION

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DIESEL ENGINES 60 to 1500 hp.

CONVERTIBLE GAS-DIESEL ENGINES 60 to 1500 hp.

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WORTHINGTON PUMP AND MACHINERY CORPORATION
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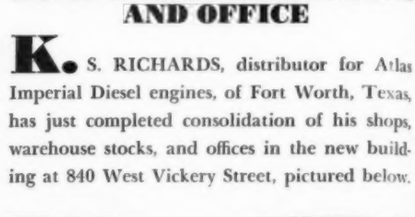
WORTHINGTON

ATLAS DISTRIBUTOR BUILDS NEW WAREHOUSE AND OFFICE

K. S. RICHARDS, distributor for Atlas Imperial Diesel engines, of Fort Worth, Texas, has just completed consolidation of his shops, warehouse stocks, and offices in the new building at 840 West Vickery Street, pictured below.



This move will enable Mr. Richards to better serve the Oil Industry in the Mid-Continent area, as well as the many owners of Atlas Diesels in his territory.

POROUS CHROME HARDENING FOR CYLINDER WALLS

THE Van der Horst Corporation of America, recently organized by Mr. Hendrik Van der Horst to introduce in America his patented process of "Porous chrome hardening" for cylinder walls, piston rings, bearings, etc., has announced the establishment of its headquarters at Olean, N. Y., where a new plant has been constructed and is in full operation, after three months of experimental work.

Mr. Van der Horst began experiments on his present process in 1932, at Hilversum, Holland, where his original plant is in operation. Later he also established British Van der Horst, Ltd., with works at Sheepbridge, Chesterfield, England, and the new plant at Olean is the third to engage in application of his revolutionary process. Mr. Van der Horst holds a major interest in all three corporations but will make his home at Olean.

The theory of Ricardo, the British Diesel expert, that cylinder wear is mainly caused by corrosion rather than friction, and the great resistance of chromium to corrosion, led Mr. Van der Horst to begin his first experiments in chrome-plating engine cylinders. Many difficulties were encountered including the problem of developing a coating sufficiently porous in texture to hold lubricating oil, but after several years his efforts were rewarded with outstanding success. In Europe his process is today in wide and growing use for Diesel, gasoline and

steam engine cylinders of all types and sizes; for compressor, pump and pneumatic tool cylinders; and for protecting other surfaces subject to wear or corrosion, including crankshaft bearings, piston rods, pins, crosshead guides, etc.

In England such prominent manufacturers of Diesel engines as R. A. Lister, Ltd., of Gloucestershire, and W. H. Dorman & Company, Ltd., of Stafford, are licensees of the process and chrome-harden the cylinders of their entire output of Diesel engines. In the United States two important chrome hardening plants are already being operated under Van der Horst licenses, those of the American Hammered Piston Ring Division of the Koppers Company, at Baltimore, and the Naval Aircraft plant, at Philadelphia.

HEMPHILL TRAINS NAVY MEN

THE third Naval District of New York City has selected Hemphill Diesel School, 31-28 Queens Blvd., Long Island City, to train a special group of one hundred enlisted Naval Personnel in the operation and maintenance of Diesel engines.

In connection with the National Preparedness Program, the Navy has a large number of yachts and other craft, many of which are powered with Diesel engines. Due to the scarcity of Diesel-trained enlisted men, a special training program has been found necessary for servicing and repair of Diesel engines in these newly-acquired ships which are needed for immediate service.

The regular civilian residential students are co-operating in this defense training program by taking training in the evening, instead of during the day, in order that the Naval enlisted men may be properly accommodated. The course of training is of an intensely practical nature, on a large variety of American-made Diesel engines.

CATERPILLAR BOOKLET

IN a just issued 32-page booklet, Caterpillar Tractor Co. lists the capacities and mechanical features of each of the eight sizes of Caterpillar Diesel marine engines.

Unusually complete from both a technical and application point of view, the booklet is printed in three colors, and is profusely illustrated with installation pictures and cutaway photographs or drawings. The first few pages of text are devoted to a description of the design and construction of the engines. The fuel injection system, crankcase and cylinder blocks, superfinished crankshafts, pistons and connecting rods, as well as almost all interior parts of the engine are given special mention.

The central portion of the book contains three-color cutaway photographs of each engine type, showing the cooling and lubricating systems, and pointing out each mechanical feature mentioned in the text. Each of the eight engine models is also listed according to horsepower, and specifications are included. With each model is a performance chart and line dimensional drawings for installation purposes.

The company's eight sizes of Diesel-Electric sets for marine use are also listed; and there is a description of service facilities available to Caterpillar owners throughout the world.

Copies of the book may be obtained free of charge by writing Caterpillar Tractor Co., Peoria, Illinois, and requesting Form 6196.

"SEA WITCH" GOES TO UNITED STATES LINES

AT noon, January 23, the United States Lines took title to the C-2 Diesel ship, *Sea Witch,* as the first of its building program in cooperation with the U. S. Maritime Commission. This is the first cargo ship to be purchased under this program and she is destined for operation on the American Pioneer Line.

Returning recently from her maiden voyage, under charter by the United States Lines, the *Sea Witch* gave good account of herself having performed beyond all guarantees. She is the first of the C-2 cargo ships to be equipped with hydraulic couplings.

The *Sea Witch* is powered with two 3155 hp. Nordberg nine cylinder Diesels and a complete description of this vessel appeared in the August, 1940, issue of DIESEL PROGRESS.

FAIRBANKS-MORSE NEW YORK BRANCH HOLDS VICTORY DINNER

TOM Drennen, Manager of the New York Branch of Fairbanks, Morse & Co., received the President's Cup for the third time at a

dinner given by the company's President, Colonel Robert H. Morse, at the Downtown Athletic Club on Friday evening, January 17.

This handsome award, suitably engraved, is presented to the branch selling the highest

percentage of its sales quota for the year and is contested for by branches throughout the United States.

Tom Drennen is well known in marine circles and has been with Fairbanks, Morse & Co. for twenty-four years, the last ten of which he has been Manager of the New York Branch.

Each year, the name of the Branch Manager winning the Cup and the name of the Salesman who obtained the largest percentage of his sales quota is engraved on the Cup for that particular year. This year, W. R. Lamb, a Diesel Engine salesman for the Company, who also has been with the Company for over a period of twenty-four years, was the winning salesman. The Cup was presented in person by Mr. A. C. Dodge, Vice-President in Charge of Sales, with headquarters at the Main Office in Chicago.

Mr. H. J. Barbour, Manager of Sales Promotion, Mr. Wesley B. Moore, Manager of Diesel Sales Division, and Mr. Robert H. Morse, Jr., Manager of the Boston Branch Office, as well as Col. F. H. Miller, President of the Canadian Fairbanks, Morse Co., Ltd., were guests at the dinner. Also, Mr. Francis S. Bushey, President of Ira S. Bushey & Sons, was a guest as well as the editors of Marine and Diesel publications. The dinner was attended by ninety employees including Department Managers and Salesmen throughout the New York Branch House territory.

MACK MARINER INSTALLATIONS

THE Marine Engine Division of The Mack Manufacturing Corp. announces the installation of Mack Mariner Diesel engines for the following:

Advance, 40-foot harbor tender owned by A. Rando of Staten Island, N. Y. Equipped with a Type W 80 hp. Mack Mariner Diesel.

Alice May, 54-foot dragger owned by Caesar Clerc of New Bedford, Mass. Equipped with a Type W 100 hp. Mack Mariner Diesel.

Americana, 45-foot party fishing boat owned by Robert Davis of Bloomington, Ill., and operating out of Key West, Fla. Equipped with a Type W 125 hp. Mack Mariner Diesel.

Nomad, 50-foot tow boat owned by J. H. Coppedge Co. of Jacksonville, Fla. Equipped with Type W 125 hp. Mack Mariner Diesel.

Duty, shrimp boat owned by the Pacetti Fish Co. of Patterson, La. Equipped with a Type W 80-100 hp. Mack Mariner Diesel.

Charope, shrimp boat owned by Freia & Dallas of New Orleans, La. Equipped with a Type W 125 hp. Mack Mariner Diesel.

A 52-foot shrimp boat for W. A. Richmond, Morgan City, La., owner. Equipped with a Type W 100-125 hp. Mack Mariner Diesel.

CHICAGO PNEUMATIC ANNOUNCES NEW DIESEL CONVERTIBLE TO GAS FUEL

IN its attractively bound and informative Bulletin 764 just issued, Chicago Pneumatic Tool Company presents a new line of Diesels, Type 16, ranging from three to eight cylinders, 375 to 1,000 hp., and arranged for conversion to gas fuel. This addition to the Chicago Pneumatic Diesel engine line is in step with the growing use of Diesels in localities where low cost gas fuel is available in abundance. The Type 16 CP engines incorporate many new developments in design, construction, and combustion control; they are fully enclosed. Bulletin 764 carries full description and specifications on this new line of Diesels: write the Chicago Pneumatic Tool Company, 6 East 44th Street, New York for your copy.

HERCULES BUYS YORK ICE PLANT

ACQUISITION of the four-story factory building, formerly occupied by the York Ice Machinery Corp., adjoining its property at Market Ave. S. and the Pennsylvania Railroad

right-of-way was announced today by the Hercules Motors Corp., Canton, Ohio.

Work of reconditioning the plant to accommodate expanding production requirements of the Hercules company already has begun. Plans call for beginning operations by April 1.

In taking over the property the Hercules company adds 164,000 square feet of factory floor space to its present facilities and approximately seven acres of property to its present tract. This gives the company complete possession of an industrial island in the center of the city covering approximately 16 acres.

Of the 164,000 additional feet of floor space the company plans to use, at present, around 120,000 square feet. Certain departments now housed in the company's present quarters will be removed to the York plant. This in turn will permit expansion of other departments of the main plant. Orders for additional machine equipment already have been placed.

Employment at the Hercules plant, which has advanced steadily in recent months to the present force of around 1,600 workmen, will be further increased to from 2,200 to 2,400 by May 1, officials of the company indicated.

LUBER-FINER DIESELPAK BULLETIN

OF especial interest to Diesel operators, the Luber-Finer Dieselpak Bulletin describes a filter element which in addition to accomplishing all normal lube oil filtering functions, also removes colloidal particles, soot, etc., without affecting compounds or additives in compounded Diesel lube oils. For complete information on this interesting development, write for the Dieselpak Bulletin to Luber-Finer, Incorporated, 2514 South Grand Ave., Los Angeles, California.

THREE NEW CUMMINS BULLETINS

CUMMINS Engine Company has just issued three most complete and informative bulletins Numbers 5185, 5182 and 5179, covering its lines of Marine, Industrial and Automotive Diesels respectively. These bulletins will supply the engineer and prospective engine buyer with all data required for the selection of the right Cummins model for the job at hand. Each model is illustrated as to overall exterior arrangement, minor assemblies and internal parts. Dimensioned drawings of the Marine and Industrial models will greatly assist in laying out machinery arrangements and floor plans. Combination fuel consumption, brake horsepower, and torque curves are also given for each model. Attractively printed and bound in distinctive color covers, these bulletins will prove most helpful to many DIESEL PROGRESS readers who will want to write Cummins Engine Company, Columbus, Indiana, for copies.

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AS PER announcement made by the Maritime Commission, the S.S. *Mormacyork*, the fourteenth C-3 cargo vessel to be placed in service, was delivered on February 7 to the Moore-McCormack Lines for its American Republics Line service from New York to the eastern coast of South America.

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A CONTRACT for the construction of five twin-screw Diesel-propelled gasoline tankers has been awarded by the United States Maritime Commission to the Albina Engine & Machine Works, Inc. of Portland, Oregon. These vessels will be 309 ft. 6 in. overall with a designed speed of fourteen knots and of about 2300 tons deadweight. The contract specified that the main and auxiliary engines are to be built by the Union Diesel Engine Company.

F. M. GARDNER JOINS COOPER-BESSEMER

FURTHERING its territorial coverage of industrial and municipal power plant projects, The Cooper-Bessemer Corporation has recently announced the affiliation of F. M. Gardner with their Diesel and Gas engine sales department.

Born and reared near Portage, Wisconsin, Mr. Gardner graduated from Endeavor Academy at sixteen and immediately went to work with the Fairbanks-Morse Company at its Beloit plant. After twenty-five years with his first employers, Mr. Gardner joined the Anderson Engine & Foundry Company as sales manager, retaining that title for six years and until he accepted a position with the Ball-Muncie Company of Muncie, Indiana. He later became a special representative of the Ideal Electric & Manufacturing Company, and just prior to joining Cooper-Bessemer held a similar position with the National Supply Company.

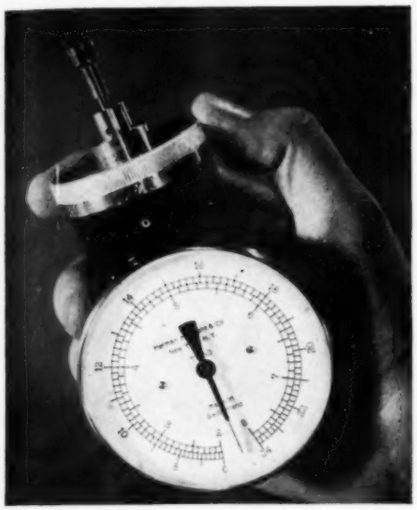
With his headquarters at the company's Mount Vernon, Ohio, offices, Mr. Gardner's territory in his new connection will include western Ohio, Indiana, Kentucky, and Tennessee, where he will represent The Cooper-Bessemer Corporation in the sale of its Stationary, Gas, and Diesel engines.

NEW HAND TACHOMETER

HERMAN H. Sticht Company, Inc., has just issued a new bulletin, No. 750, describing the new Standco Universal type Hand Tachometer, direct reading, centrifugal type.

These tachometers cover a wide range of speeds and come in four standard range combinations, covering speeds between 30 and 48,000 rpm. The instruments have a rotating gear shift in a knurled cover for changing to the five speed ranges, have knife-edged pointers which make possible greatest accuracy in the readings, have

a large three-inch diameter dial and wide open, easy-to-read scales. They are accurate, direct reading, and no calculations are necessary to measure rpm. and fpm.



Readers of DIESEL PROGRESS who are interested may secure a copy of Bulletin No. 750 by writing to Herman H. Sticht Company, Inc., 27 Park Place, New York, N. Y.

CATERPILLAR APPOINTS

JAMES H. Deaderick, who has been assistant sales manager of the western sales division of Caterpillar Tractor Co. since 1939, has been appointed the company's assistant general parts manager.

James H. Deaderick.

Mr. Deaderick, whose headquarters have been at Caterpillar's San Leandro, California, offices, has been transferred to Peoria. In his new capacity, under the general managership of L. G. Morgan, Mr. Deaderick will have active

charge of all general administrative activities in the Parts Department, as well as supervision of all Parts Depots. W. B. Gordon has been appointed Parts Manager in charge of physical inventory and its control; and A. H. Yingst, Parts Manager in charge of orders, invoicing, distributor contact, etc.

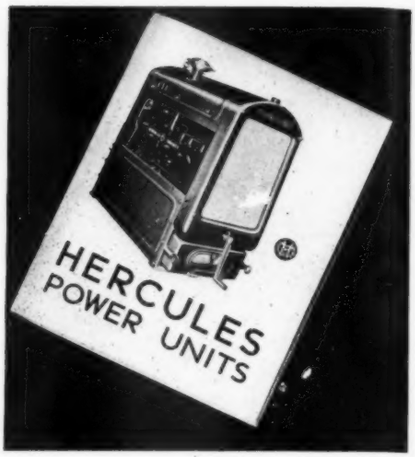
CONNERSVILLE WILL ADD ANOTHER DIESEL ENGINE

THE Cooper-Bessemer Corporation has received from the city of Connersville, Indiana, an order for one of its Type JS Diesel engines, to be delivered on or about March first. This unit is to form an addition to the present municipal light and water plant in which two of the same make Diesel engines are now serving. It is interesting to note that the two original units, which were intended for generating electric power for motor-driven water pumping equipment, were later called upon to also furnish electricity for street lighting. To meet these increased demands and provide adequate standby power, the two 363 hp. engines are being augmented by a 415 hp. unit. The new engine will drive a 300 kw. Westinghouse generator and 7.5 kw. exciter. John W. Smith & Son, of Indianapolis, Indiana, are consulting engineers in charge of the work.

HERCULES POWER UNIT CATALOG

ONE of the most thoroughgoing and useful works of its kind to come to our attention in recent years is the new Power Unit Catalog and Application Field Book just issued by Hercules Motors Corporation.

This 76 page book carries complete factual data covering Hercules six cylinder, four cylinder, and two cylinder gasoline and Diesel power units and is amply illustrated with model cuts, dimensional drawings, and power curves. The book also contains working load tables, complete specifications and much general information of interest and value to all power unit



users. Attractively and substantially bound, this Catalog will prove to be a valuable guide to the selection of power units. Our hearty congratulations to Hercules Motors Corporation on the preparation of this fine work.

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THE Navy Department, Washington, D. C., has awarded a contract totaling $5,740,000 to the Fairbanks, Morse & Company to furnish fourteen sets of propelling machinery for submarine chasers. These will be built at the Company's Beloit, Wisconsin, plant.

DIESEL PROGRESS

VAUPEL TO COOPER-BESSEMER

CARL H. Vaupel was recently appointed Assistant to President and General Manager of the Cooper-Bessemer Corporation, Mt. Vernon, Ohio, and Grove City, Pennsylvania.

Mr. Vaupel is a graduate of the University of Illinois, Class of 1924, and from 1924 to 1937 he was associated with the Beloit, Wisconsin, office of Fairbanks, Morse & Company, Diesel Engine Division, in various capacities in the experimental, research, and engineering departments.

From 1937 until his new appointment he was connected with the Northern Pump Company as Eastern Sales representative, and the Aircraft & Diesel Equipment Corporation as Sales Manager.

NAVY blue and gold will soon replace fishermen's oilskins aboard twenty-one of Southern California's Diesel-powered seine vessels of from 78 ft. to 105 ft. More than half have been ordered to various Southland yards for conversion to service use. Upon completion of alterations, it is understood that the Naval Reserve will take over units under command of Lieutenant L. A. Guin, basing at San Pedro. Boat yards handling a portion of the work include: Fellows and Stewart, Al Larson's, Wilmington Boat Works, Harbor Boat Building Co., South Coast Co., San Diego Marine Construction, Campbell Machine Co., and Martolich Shipyard.

STANDARD OIL OF NEW JERSEY ISSUES TWO IMPORTANT BULLETINS

HIGH SPEED DIESEL LUBRICATION: a well illustrated, 16 page, booklet explaining in readily understood terms the lubrication problems with today's high speed Diesels.

ESSOLUBE HD: a complete description of the properties of this widely adaptable, high stability, high viscosity index detergent type oil for heavy duty gasoline and Diesel engines.

Address Standard Oil Company of New Jersey, Publications Department, Room 1569, 26 Broadway, New York City, requesting these bulletins.